

The MINING CONGRESS JOURNAL

Volume 17

APRIL, 1931

No. 4

PRESENTING

Whither America

Regional Markets

▲ ▲ ▲

Effect of Room Widths
on Mechanical Loading Production

Briquettes from Carbonized Lignite

Rock Dusting in a Pennsylvania Coal Mine

▲ ▲ ▲

Accident Prevention Work
on the Mesabi Range

Mining Methods and Costs
at the Spring Hill Mines

▲ ▲ ▲

Legislative Review
Industrial Development Conference

Contributors

*John E. Edgerton, E. F. Gerish, G. B. Southward, Newell G. Alford,
Edvard Prostel, C. W. Owings, A. C. Borgeson, A. L. Pierce*

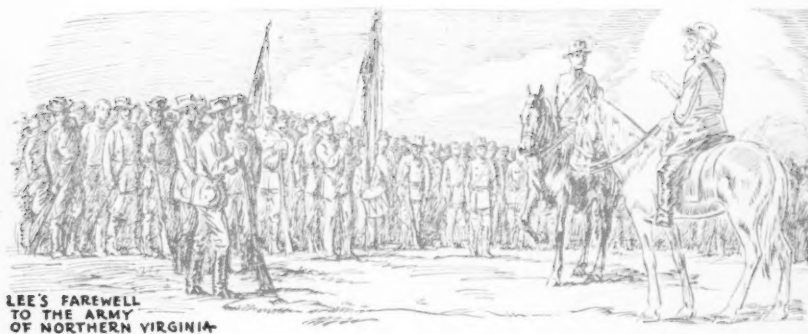


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"I Reciprocate Your Desire to Avoid Useless Effusion of Blood"

(Lee in his reply to Grant at Appomattox)

Although still capable of prolonged resistance to the Northern Armies, Lee—convinced that the South could not win the war—accepted Grant's terms at Appomattox to prevent further sacrifices on the part of his men.

Even more than his brilliant military record, Lee's constant concern for the welfare of his soldiers endeared him to the hearts of his countrymen and made him for evermore "The Idol of the South."

Throughout the South, and elsewhere, today, thousands of coal mine officials are placing the welfare of their men above all other considerations; and we are proud to cooperate with them by furnishing fuse which—when properly used—assures safe blasting.

THE ENSIGN-BICKFORD CO.
SIMSBURY CONNECTICUT

"Do not short Fuse"
--Fuse should be cut long enough for the end to extend well out of the mouth of the bore hole when the primer cartridge is in place.

All holes should be well tamped.





To Move Your Coal it Must Be Cleaned



The revamped tipple and washing plant of the Barnes & Tucker Company, Barnesboro, Pennsylvania, is a recently completed RandS installation.

Designed for handling 300 tons of run of mine per hour, the new arrangement provides a shaker screen for handling run of mine to two Arms Double Deck Vibrating Screens. Two sizes are taken off, $3\frac{1}{2}$ " x 1" and 1" x $\frac{1}{2}$ " and each discharged into a separate Menzies Hydro-Separator for washing and separating.

Approximately 100 tons per hour are washed and separated in the two Menzies Hydro-Separators which produce a clean, graded premium coal.

Let us apply the RandS Process of Coal Cleaning in your plant—take advantage of the higher price premium coals secure—Menzies Hydro-Separators can be installed in your tipple—let us tell you how. RandS offers "consultation without obligation."

May we send you a copy of Catalog No. 129 in which is contained a graphic review of RandS installations, processes and equipments.

ROBERTS AND SCHAEFER CO.

ENGINEERS and CONTRACTORS

PITTSBURGH, PA., 418 OLIVER BLDG. WRIGLEY BUILDING, CHICAGO HUNTINGTON, W. VIRGINA. 514 NINTH AVE.



THE MINING CONGRESS JOURNAL

VOLUME 17

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Practical Operating Men's Department

COAL

*Briquettes from Carbonized Lignite
Rock-Dusting in a Pennsylvania Coal
Mine*

METAL

*Accident Prevention Work on the Mesabi
Range
Mining Methods and Costs at the Spring
Hill Mine*

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position in Cincinnati, May
11-15.



and **PRESTO!** —it spouts a rod of fiery red

You are in the great Morgan Rod Mill of the Roebling plant. Only a handful of men are present. Yet, here is a veritable bee-hive of activity—and before your eyes is performed a feat of modern industrial magic.

Here, with almost unbelievable swiftness, machines of super-human skill and accuracy transform billets of steel into glowing coils of snake-like rod. Two inches by two and 28 feet long, a square billet is fed into the furnace at one end of the mill—and presto! it is spouted out at the other end, a round rod about 700 feet long and in any desired diameter from .200" to .360".

In making Roebling "Blue Center" Wire Rope the most modern of production facilities are employed in every process. To insure the exceptional quality and uniformity for which it is noted, no stone has been left unturned.

JOHN A. ROEBLING'S SONS COMPANY

TRENTON, N. J. Branches in Principal Cities

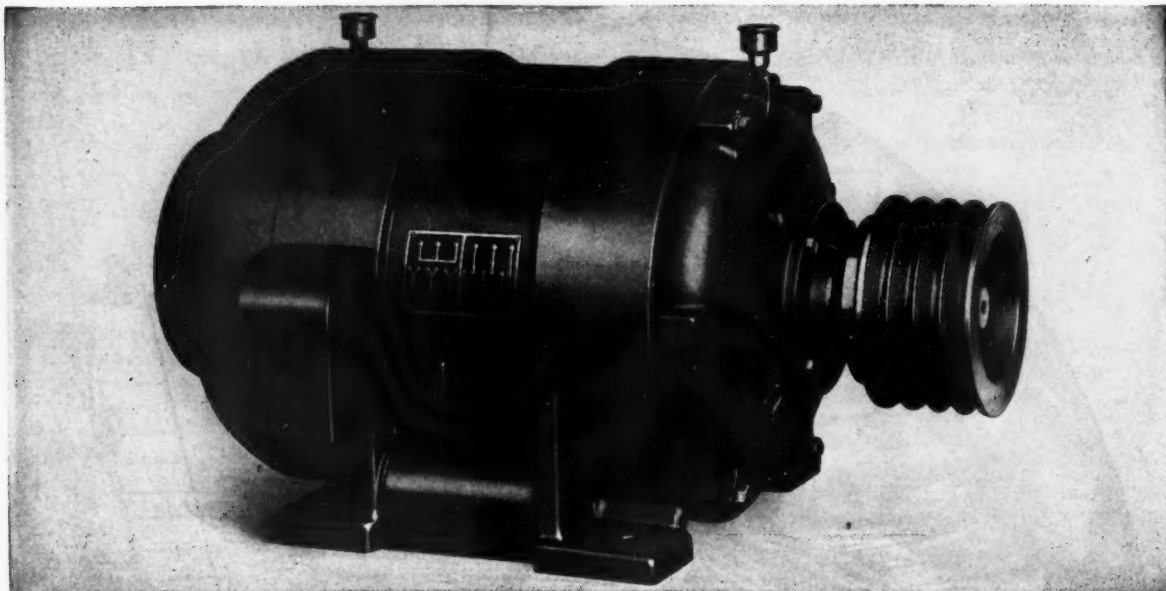
WIRE • WIRE ROPE • WELDING WIRE • FLAT
WIRE • COPPER AND INSULATED WIRES AND
CABLES • WIRE CLOTH AND WIRE NETTING

ROEBLING



"BLUE CENTER"
STEEL

WIRE ROPE



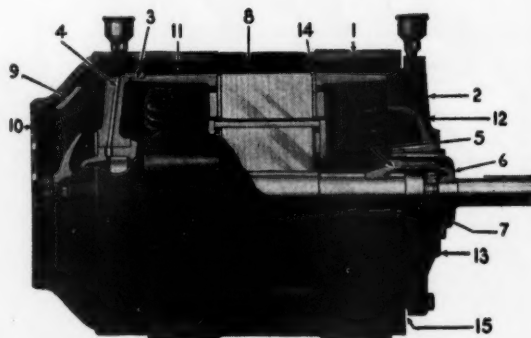
Safeguarded —

against dust, dirt, acid fumes, or moisture

—those factors that tend to shorten the life of windings — the Allis-Chalmers, totally enclosed, fan-cooled motor is ideally suited for operation in chemical plants, foundries, cement plants, crushing plants, mining and coal preparation. Being weather-proof, it is suitable for outdoor service.

—Important Features—

- 1—Cast steel end frames in combination with solid bearing housings (No. 2) provide complete enclosure without the use of sheet metal or other auxiliary parts.
- 2—Cast iron bearing housing serves also as end closure fitted to end frames with long rabbet fit (No. 3). Removable without exposing the bearings.
- 3—Rabbet fit forms a tight joint between end closure and stator frame.
- 4—Compression cup and grease duct, an integral part of housing assembly.
- 5—Bearing cartridge remains on shaft when motor is dismantled.
- 6—Cap secured to cartridge by screws prevents exposure of bearing and lubricant when rotor is removed.
- 7—Bearings of standard metric dimensions of medium series, secured by lock nut.
- 8—Stator and rotor laminations of silicon steel assure minimum core loss.
- 9—Cast aluminum fan, balanced, keyed and locked on shaft, designed for strength and efficient windage.
- 10—Fan housing with its grid cover completely isolates fan for safety.
- 11—Unobstructed air passage made shallow to increase air velocity over cooling surfaces.
- 12—Flush type pipe plugs for inspection of air gap.
- 13—Clamping ring.
- 14—Stator teeth supported by punchings of heavy plate steel.
- 15—Space for inserting a pinch bar to pry loose the bearing housings.



Sectional View Illustrating the Compact Design, Sturdy Mechanical Construction, and Accessibility.

ALLIS-CHALMERS

—Allis-Chalmers Manufacturing Company, Milwaukee—

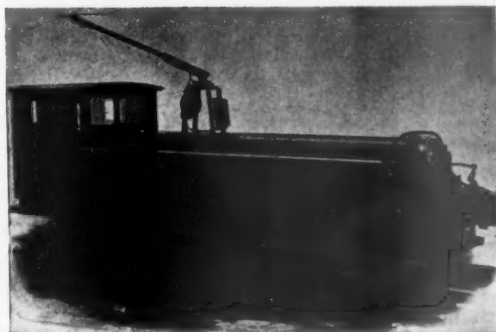
Ore Moving Power Complete in the Jeffrey Line . .

From the small but powerful Trammer, to the big husky yard haulage locomotives, Jeffrey offers you a complete service in ore moving.

Every unit is the product of years of experience in building mining locomotives of all types. Jeffrey engineers know mining, and build for miners.

Ground Potential Control

Available on trolley types. Two contactors in series on the positive side take the main break between first position and "off." No main current broken in the drum controller, which is otherwise standard. Controller is in negative side of line, so there is no difference of potential between case and contact cylinder. Renders arcing, burning of contact fingers or casing impossible. All the essential advantage of contactor control without its expense and complication.



LARGE TROLLEY

Built for main haulage and for switching duty around smelters and concentrating plants. Can be supplied with two or more motors and air or hand brakes. Optional—contactor or ground potential control.

THE JEFFREY MANUFACTURING CO.

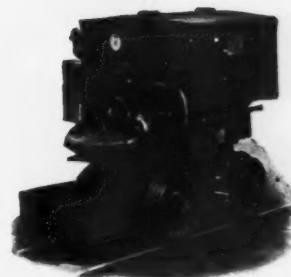
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Sales and Service Stations: Pittsburgh, 600 Second Ave.; Scranton, 122 Adams Ave.; Terre Haute, Ind., 319 Cherry St.; Birmingham, 1911 Avenue A; Winchester, Ky., 122 North Main St.; Salt Lake City, 153 West Second South St.

Jeffrey Manufacturing Company, Ltd., of Canada

Head Office and Works: Montreal; Branch Office, Toronto;
Service Station, 210 Ninth Avenue W. Calgary.



JEFFREY TRAMMER

Small but powerful trammer available either in trolley or battery type. Enters any tunnel a mule can. Operator's platform readily removed for entering the cage.



STORAGE BATTERY

Heavy for mine and quarry haulage. Side and end frames may be either steel channels or steel slabs. Equalized, automatically locking screw brakes are standard. Battery box mounted on pivot to permit swinging across chassis, rendering motor and other parts accessible for inspection and repair.



TROLLEY HAULAGE

Rolled steel slab side frames cut to provide accessibility to brake rigging. Standard type mine motors. Optional—contactor or ground potential control.

JEFFREY METAL MINE EQUIPMENT



PORTABLE
DEPENDABLE
COMPACT
RUGGED
FOOLPROOF
SAFE

NEW MODEL A

FAIRMONT

ELECTRIC MINE PUMP

FAIRMONT Electric Mining Pumps have, for years, thoroughly demonstrated their worth and dependability in important coal fields, both here and abroad.

Now—Fairmont offers a new Model A Portable Electric, which is the latest word in modern mine pump construction.

This new portable pump is so well designed and so rugged in construction that it will function for a surprisingly long period without interruption or the necessity of repairs. It is light enough to be moved readily from place to place and is so

compact that it can be operated in narrow entries or very low head room.

As the gears are enclosed and operate continuously in an oil bath, and the bearings are lubricated from a can-operated oil pump in the crank case, the pump just cannot be neglected; it needs no attention.

This new Model A Fairmont Portable Electric Mine Pump is made in two sizes—50 gals. per min. and 100 gals. per min.—and is powered with motors of 3 to 7½ H.P. Complete specifications mailed on request. Ask for Bulletin No. 106.

FAIRMONT MINING MACHINERY COMPANY

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Pumps Tipples Conveyors Car Retarders Screens Car Hauls Picking Tables Underground Conveyors

PEALE DAVIS DRY CLEANING PLANTS

The New COSCO "D-8"



The Little
DRIVE
with the
**BIG
PUNCH**

Works Efficiently Where a
Bigger Drive Would be Wasteful

at **ONE-FIFTH
THE COST**

ECONOMIC needs have brought economic measures in many fields. Why not in coal mining?

One of the most wasteful wasters in coal production is the use of high power where less power will do the work.

If a dwarf is equal to a task, why employ a giant? That is the question Cosco engineers asked themselves—and then answered it with the new "D-8" Conveyor Drive.

The "D-8" is the smallest, most compact drive made—easily portable and sturdily built to do the day's work without fuss.

It operates efficiently with a 5 to 7½ H.P. motor, but is built to withstand the strains of a 10 H.P. motor. The design, however, permits not larger than a 7½ H.P. motor to be mounted—thus providing definitely against overloading by over-

enthusiastic owners. For, after all, it's a little fellow and there IS a limit to the burden it will carry. Efficiency is its middle name—the most consistent worker at the lowest operating cost ever obtained in a drive of its size.

It is a fit running mate in every respect for the new Cosco "C-20," the drive which has completely revolutionized all previous ideas of conveyor drive performance.

The "D-8" is the ideal small-space drive for conveyors feeding larger systems, or for any other work where a comparatively short line of troughing is to be used.

Cosco Conveyors are saving money for both large and small producers. Hundreds of successful installations are upholding the Cosco reputation in American mines.

Cosco Conveyors, Troughing and "Duckbill" are 100 percent American. Built in America—to American standards—by American workmen—from American materials.

Let our engineers demonstrate what Cosco can do for you in increased production, or lower cost, or both.

CONVEYOR SALES CO., INC.
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Chicago, Ill., 224 So. Michigan Avenue.
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DISTRICT
SALES
OFFICES



OF significance to anyone interested in enduring track equipment is the fact that Carnegie Mine Ties are manufactured from Copper Steel. A recent test on Copper-Steel ties showed their loss of weight from corrosion to be only $\frac{1}{3}$ to $\frac{1}{2}$ as much as that for ordinary steel ties. The actual figures in this test, averaged for ten ties, shows a loss of 19.4 lbs. for copper steel against a loss of 41.9 lbs. for ordinary steel ties. Copper-Steel's resistance to rust is of particular importance in mines where floors are damp, as excess moisture greatly hastens corrosion.

In addition to their protection against corrosion, Carnegie Copper-Steel Mine Ties present many other advantages. These ties are available in a wide range of weights and types, varying from a very shallow tie for room work, weighing only $2\frac{1}{2}$ pounds per foot, to a heavy channel tie weighing 9 pounds per



foot which will accommodate rails up to 85 pounds. Due to sectional design and efficient distribution of metal, Carnegie Ties will not buckle under proper service. Riveted clips eliminate loose parts and special tools. The broad foot and wide bearing surface serve the double purpose of preventing the tie from sinking into soft bottom and crushing on hard bottom.

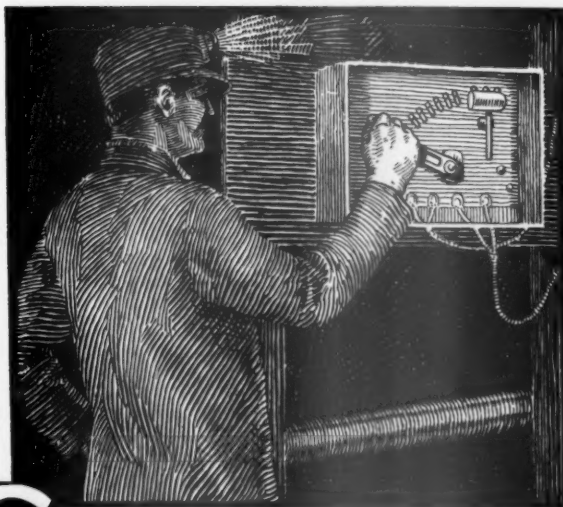
The heavier channel sections are suitable for main haulage and entry work. Either riveted clips or drop forged clips and bolts are furnished as the service may require. The wide spread and ever-increasing demand for Carnegie Copper-Steel Mine Ties confirms their suitability for all phases of mine haulage. From the face to the tippie, more than half a million Carnegie Ties are efficiently and economically carrying their load with a properly designed tie for every purpose.

CARNEGIE STEEL COMPANY - PITTSBURGH, PA.

Subsidiary of United  States Steel Corporation

129

CARNEGIE  MINE TIES



**KEEPING DOLLARS
FROM WAITING
ON DIMES**

SAVE A THOUSAND NEEDLESS STEPS

WHERE motors are widely separated and controlled by non-automatic starters, someone must take a thousand needless steps each time the power is interrupted. Someone must go from starter to starter and again restart the motors.—“Dollars Waiting on Dimes”. The cost of these thousands of needless steps will soon pay for equipping with O-B Automatic D.C. Motor Starters. With automatic starters, restarting by hand is unnecessary. When power returns, the motors are automatically brought up to speed; and surely and safely cut across the line. A thousand needless steps are saved, and motor attendants are released for more important work.

Are you interested in securing large returns on a small investment? O-B Motor Starters will give your sense of values a pleasing shock when you learn how little they cost in proportion to the saving they effect. Booklet 568M describes these new D.C. starters. Send for a copy.

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Company, Limited
Niagara Falls, Canada
1363M



O-B Automatic D.C. Starter

This new starter has many practical advantages. Turn to page 26-27, O-B New Products Supplement No. 4 for complete description, or send for Booklet 568M.

Ohio Brass Co.

NEW YORK PHILADELPHIA PITTSBURGH BOSTON CHICAGO CLEVELAND LOS ANGELES ST. LOUIS SAN FRANCISCO ATLANTA DALLAS SEATTLE

PORCELAIN
INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING
MATERIALS
VALVES

286

G-E Locomotives in
Rochester & Pittsburgh Mines

61

G-E Locomotives in
Clearfield Bituminous Mines

70

G-E Locomotives in
Chicago, Wilmington and Franklin Mines

82

G-E Locomotives at
Elkhorn

422

G-E Locomotives at
Glen Alden

175

G-E Locomotives in
Consolidation Coal Co. Mines

51

G-E Locomotives in
Pittsburgh Coal Co. Mines

Facts

and the reason

THEY continue to buy year after year: because they were impressed by the performance of their first G-E locomotives; because they approve of the refinements constantly appearing in the additional G-E locomotives they buy; because they are safeguarded by a thorough yet reasonable renewal-part service; and because they appreciate the ever-ready, easily obtainable G-E service that does not end with the sale.



General Electric builds every commercially successful type and size of mining locomotive; safeguards them with a reliable renewal-part service; and then stamps upon them this monogram—G-E in a circle—a world-renowned symbol of dependable electric equipment.

360-62

JOIN US IN THE GENERAL ELECTRIC PROGRAM, BROADCAST EVERY SATURDAY EVENING ON A NATION-WIDE N.B.C. NETWORK

GENERAL ELECTRIC

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES



The Stubbed Toe that Started the Lehigh Navigation Coal Company System

One day, in 1791, "honest Philip Ginter," a poor hunter and trapper, stubbed his toe against a "black stone" on Sharp Mountain, near Summit Hill, nine miles northwest of Mauch Chunk.

Ginter showed the "black stone" to Colonel Jacob Weiss, of Fort Allen (now Weissport), who took a lump to Philadelphia and was assured by Charles Cist, a printer, that it was really "stone coal." Then Cist, with John Nicholson and Michael Hillegas, quickly organized the Lehigh Coal Mine Company. Thus, the rock that Ginter stubbed his toe against was the beginning of the great Lehigh Navigation Coal Company system.

IN NO BRANCH of explosives manufacture has research played a more important part than in the development of permissible explosives for coal mining. In this field Hercules research has been signally successful, leading in developing the high-count permissibles—Hercoals—that have so greatly increased lump production and reduced costs.

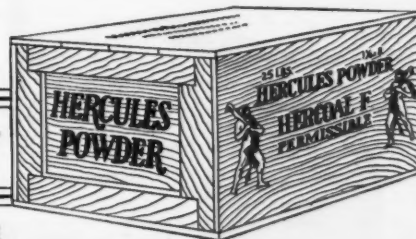
Also, in the simplification of permissible lists Hercules has been a pioneer. Literally, hundreds of explosives have been entered on the permissible lists. Hercules recommends its list of nine, which will meet every coal blasting requirement in the United States.

Behind every cartridge of a Hercoal, Red H, or Collier permissible, there is the experience of a skilled corps of service men co-ordinated with the explosives research of an exceptional staff of Hercules chemists. This has contributed materially to industrial progress.

HERCULES POWDER COMPANY
INCORPORATED

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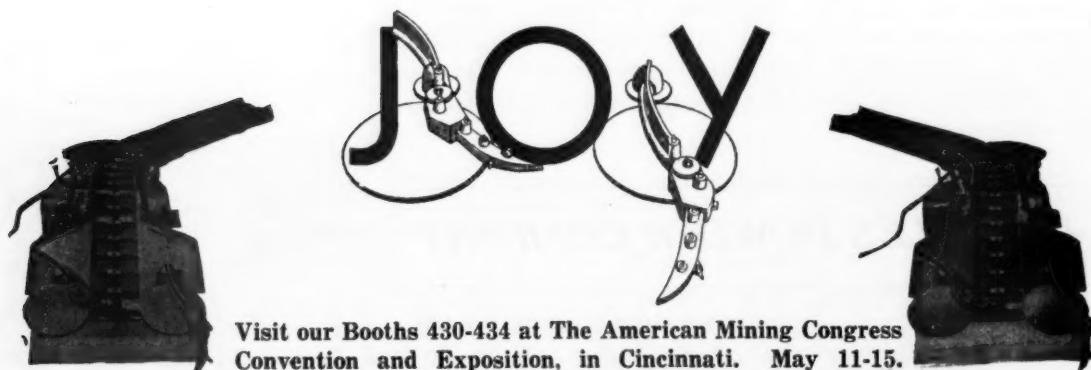




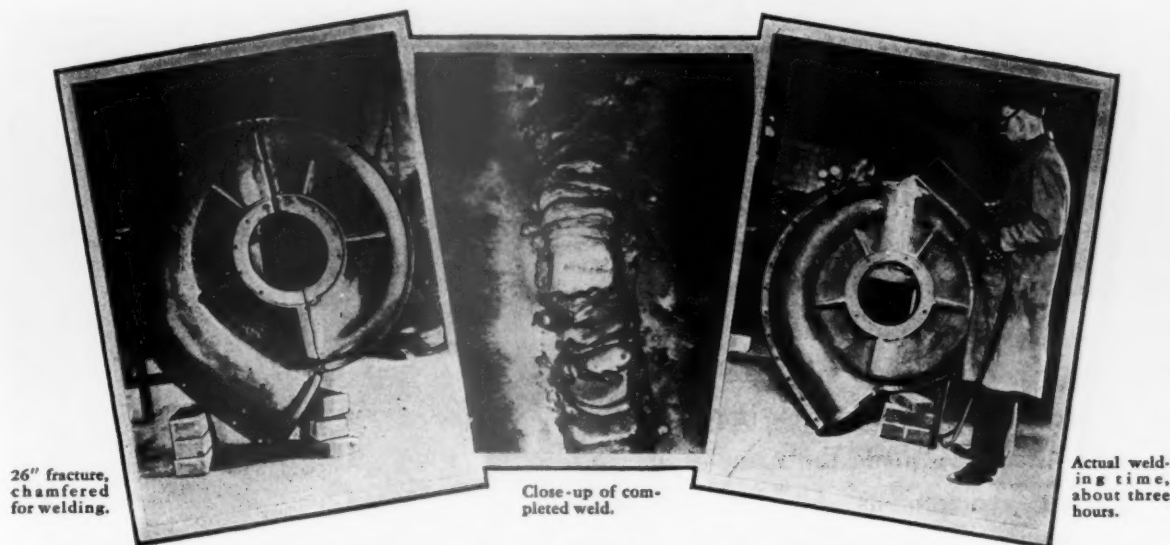
A complete loader for low coal

Opening up new possibilities in the mining of low coal, the Joy 7-BU extends the limits of completely mechanical loading. This fast and flexible machine will operate in a 48-inch seam. In its capacity of two tons or more per minute and in its easy one-man control, it is identical with the larger 5-BU. Its unique feature is the discharge end with its single strand, universal link, roller flight conveyor (shown flexed in the small cuts below). This is the loader we exhibited at Cincinnati last May. This year we will show the Joy 5-BU at the exposition. In low or high seams these capable machines bring you the fullest advantages of loading that is completely mechanical. They are efficient and trouble free, and are time and money savers. They multiply production at reduced cost per ton. We would like to show you the possibilities of Joy loading at your mine. Write for information or let us give you an estimate of what Joy loaders will do for you.

JOY MANUFACTURING COMPANY
FRANKLIN, PENNSYLVANIA



Visit our Booths 430-434 at The American Mining Congress Convention and Exposition, in Cincinnati. May 11-15.



26" fracture,
chamfered
for welding.

Close-up of com-
pleted weld.

Actual weld-
ing time,
about three
hours.

Repair Welded *with* TOBIN BRONZE *to prevent warpage or internal strains*

There is a suitable Anaconda Filler Rod for every bronze-welding purpose. Principal Anaconda Welding Rods, with their melting points, are listed below:

for oxy-acetylene welding

Tobin Bronze*	1625°F
Manganese Bronze	1598°F
Brazing Metal	1634°F
Naval Bronze	1625°F
Electrolytic Copper	1981°F
Silicon Copper	1981°F
Phosphor Bronze	1922°F
Everdur*	1866°F

for arc welding

Silicon Copper	1981°F
Phosphor Bronze	1922°F
Everdur*	1866°F

*Reg. U. S. Pat. Off.

A CENTRIFUGAL pump housing weighing 350 lbs. became fractured across the surface. To replace a casting of this size would have entailed an expense many times greater than the cost of repair.

Tobin Bronze Welding was used in preference to ferrous welding in order to eliminate possibility of warpage or internal strains. For with Tobin Bronze it is necessary to heat the surfaces of weld areas to a dull red only. This mild heat does not expand the metal sufficiently to cause warping or subsequent cracking.

Publication B-13, containing full information on all Anaconda Welding Rods, will be sent free on request.

* * *

Anaconda Welding Rods are available through leading distributors of welding equipment and supplies. For those requiring small quantities, Anaconda Welding Rods can now be obtained in clearly labelled ten-pound packages.

THE AMERICAN BRASS COMPANY

General Offices: Waterbury, Connecticut
Offices and Agencies in Principal Cities

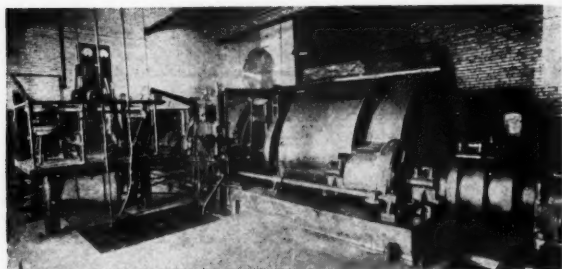


ANACONDA WELDING RODS

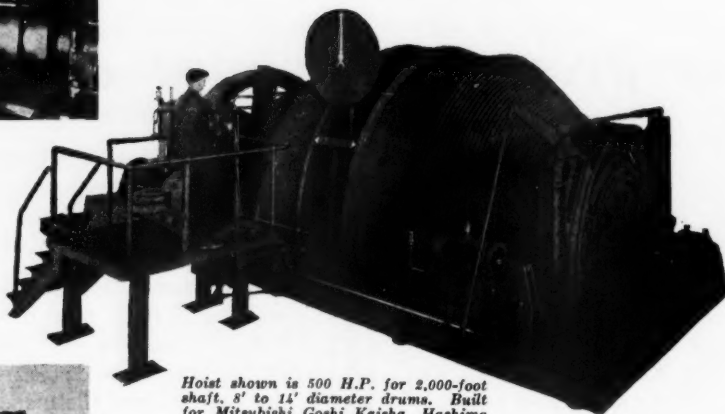
VULCAN builds every type of hoist for every mining need. The resources of over 80 year's experience, advanced engineering practice, high-grade materials and careful workmanship have set the standards that have made the name of Vulcan synonymous for the highest efficiency and complete flexibility.



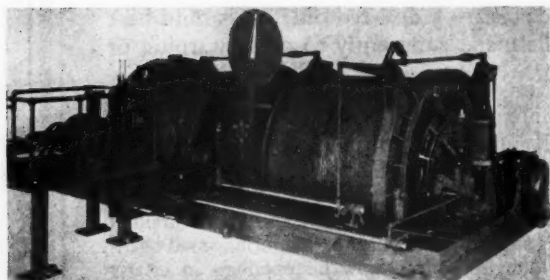
1,300 H.P. electric hoist for an anthracite mine, equipped with 16' to 10' tight and loose cylindrical drums. The two 13' diameter cast steel brakes are the parallel motion post type. Clutch is dental type with Vulcan patented clutch interlocking rig. Drum speed is 18.6 R.P.M.



1,200 H.P. electric hoist at an anthracite mine. Drum diameter 9'; rope speed, 1,872 F.P.M.; rope diameter 1½"; weight of cage, 11,000 lbs. Capacity, 71 cars per hour. Two installed.



Hoist shown is 500 H.P. for 2,000-foot shaft, 8' to 14' diameter drums. Built for Mitsubishi Goshi Kaisha, Hashima Shaft, Japan.



1,200 H.P. electric hoist in Pennsylvania. Drum diameter 9'; rope speed, 1,872 F.P.M.; rope diameter, 1½"; weight of cage, 11,000 lbs.; and weight of loaded car, 11,500 lbs. Capacity, 80 cars per hour.

VULCAN equipment includes steam, gasoline and electric locomotives, shaking conveyors, scraper loaders, coal crushers, fans, kilns, gears and special castings. Write for catalogs. Vulcan Iron Works, Wilkes-Barre, Penna.

VULCAN ^{of} **WILKES-BARRE**
HOISTS



One easy jump



that puts you in the king-row

MECHANIZATION of loading—that rapidly developing means to profit in coal production—is within reach of every producer by the simple and inexpensive means of the Mt. Vernon pit car loader. Its adoption is simple and adaptable to existing mining systems without heavy outlay for these machines or other equipment.

U. S. Bureau of Mines figures show that this means of loading is by far the most rapidly growing. Coal loaded this way increased 263.8 percent in 1929 over the preceding year.

The advantages of this type of ma-

chine are concentrated in Mt. Vernon loaders.

Their unusual simplicity and ease in handling due to the folding forward pony truck, their Z-bar frame construction, their ball bearings housed and sealed in grease, and the sturdiness and ready accessibility of all parts make them outstanding in operation.

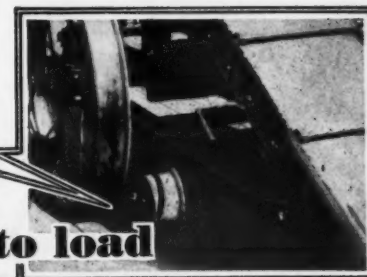
Let us explain more to you about how simply and how well these loaders combine the advantages of both hand and mechanical loading and fit into any mining system. Write for photographs and sample specifications.

THE MT. VERNON CAR MANUFACTURING CO.
MOUNT VERNON, ILLINOIS

MT. VERNON PIT CAR LOADERS



IN A SECOND
ready to move or ready to load



ATLAS

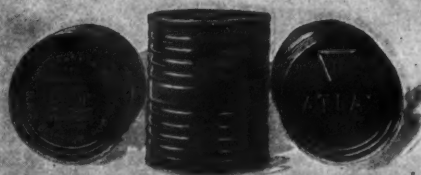
COAL EXPLOSIVES

Permissible
Powders

"A grade for
every condition"

AMMONIA NITRATE PERMISSIBLES	U. S. BUREAU OF MINES RATINGS		FUME RATINGS	MINIMUM NO. OF 1½ X 8 CTGS. PER 50 LB. CASE	REMARKS
	U. S. C.	VELOCITY FT. PER SEC.			
COALITE A L.F.	204	11,390	A	133	FOR TOP AND BOTTOM ROCK BLASTING
COALITE B L.F.	208	11,380	A	160	FOR PRODUCTION OF COK- ING COAL AND PILLAR EXTRACTION
COALITE G L.F.	218	7,970	A	143	FOR PRODUCTION OF LUMP COAL FROM STRONG AND RESILIENT COALS
COALITE E L.F.	237	8,230	A	132	
COALITE K L.F.	224	9,380	B	220	FOR PRODUCTION OF LUMP COAL FROM WEAK AND CRUSHED COALS
COALITE M L.F.	207	9,640	B	180	
COALITE S L.F.	213	7,710	A	160	
GELATINOUS PERMISSIBLES					
GEL. COALITE X L.F.	253	9,810	A	95	FOR PRODUCTION OF LUMP COAL AFTER ARC WALL TOP CUTTING
GEL. COALITE Z L.F.	237	16,800	A	100	FOR BOTTOM AND TOP ROCK BLASTING UNDER WET CONDITIONS

Black
Blasting
Powder



Seven Standard Granulations
Special Granulations

ATLAS POWDER COMPANY

A proper explosive for every blasting requirement
WILMINGTON, DELAWARE

Branch Offices:

Allentown, Pa.; Birmingham, Ala.;
Boston, Mass.; Charleston, W. Va.;
Chicago, Ill.; Des Moines, Iowa;
Houghton, Mich.; Joplin, Mo.;
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Pa.; Philadelphia, Pa.; Pittsburg,
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Pa.; St. Louis, Mo.; Wilkes-Barre, Pa.

1½, 1½, 1½, 1½ and 2-inch pellets of compressed black powder, each pellet 2 inches long and made up in water-proof cartridges 8 inches long. It's easier, safer and more economical to use than Granular Blasting Powder.

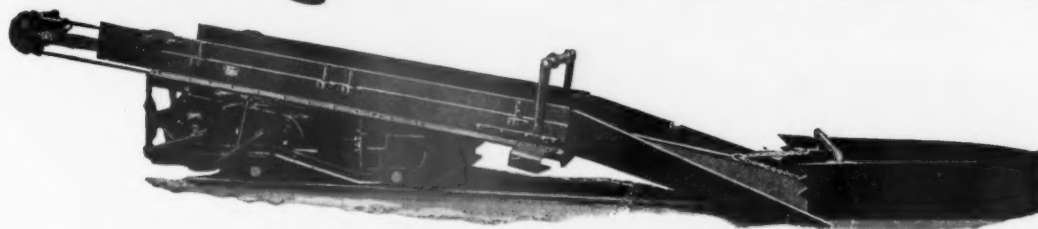
GRADE A
#3 1½ X 8" CTGS.
50 LB. CASE
MEDIUM BURNING RATE

GRADE B
#3 1½ X 8" CTGS.
50 LB. CASE
SLOWEST BURNING RATE

GRADE C
#3 1½ X 8" CTGS.
50 LB. CASE
FASTEST BURNING RATE



1,580,000 Tons of Coal Were Loaded in 1929 by Scraper Loaders



Goodman Entryloader. Type 136. Working Position.

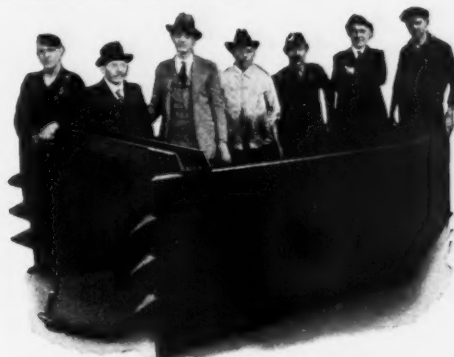
Self-contained—Self-propelled—Easy to handle loads on the entry—No room tracks—Increases lump—Increases tonnage per man—Concentrates work—No handling of scrap—Direct or alternating current—Open or Government Approved electrical construction.

Winding Engines for Scraper Scoops or General Service

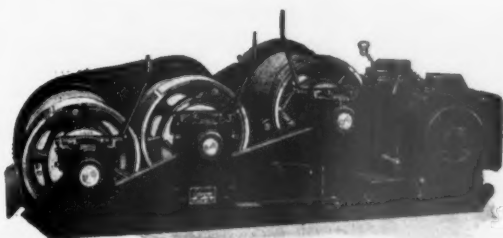
Two or Three Drums—3-4 to 3-Ton Scoops—10 to 125 H.P.



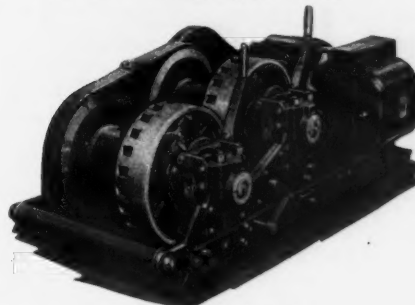
Type 436. 125 H.P.
Three drums on one shaft.



Three Ton Scraper Scoop.
Used with winding engine on left.



Type 636. 35 H.P.
Three drums in tandem. Open or Gov't approved.



Type 936. 35 H.P.
Two drums in tandem.

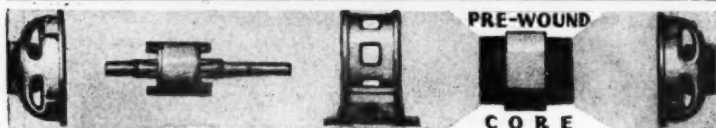
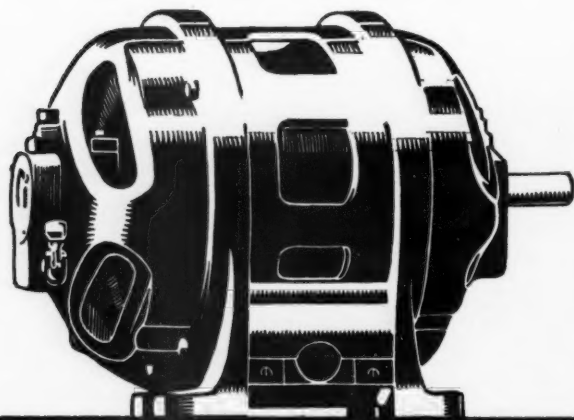
GOODMAN MANUFACTURING COMPANY
Locomotives - Loaders - Coal Cutters
HALSTED ST. at 48TH.
CHICAGO --- ILL.
PITTSBURGH - WILKES-BARRE - HUNTINGTON, W.VA. - BIRMINGHAM - ST LOUIS - DENVER - PRICE, UTAH

(46)

A NEW Motor

for
Coal Mines

Announcing
the **THRIFTY**
NEW **CS**



NEW SPEED OF REPAIR—Motors can be repaired in far less time because of the renewable Pre-wound Core. Press out a damaged core, press in a new one and the motor is back in service within an hour.

NEW ECONOMY IN SPARE PARTS STOCKS—Now, it takes only a few Pre-wound Cores to provide the same assurance of uninterrupted production as a large number of spare motors or spare frames. Pre-wound Cores are the same for both standard and for so-called "special" designs.

NEW INTERCHANGEABILITY OF PARTS—Easy change of mechanical construction and speed characteristics of motors is now possible by users. The Pre-wound Core is interchangeable as well as renewable on all motors of the same rating regardless of mechanical form.

NEW STANDARDS OF RIGIDITY—All motor frames, whether used for standard horizontal, vertical or side mounting motors, are of a rigid, non-sag design. Bearings remain permanently in line and the air gap is unchanging.

TO MEET the demand of today's coal producers for a thrifty motor, Westinghouse presents a new squirrel-cage motor with a unique feature. The electrical part containing the motor windings, called the Pre-wound Core is a unit which may be easily and quickly renewed in all motor ratings.

The Pre-wound Core, found only in Westinghouse motors, thus introduces new speed of motor repair, new economy in spare parts stocks, many advanced economies of operation, and a greater assurance of uninterrupted motor power.

The nearest Westinghouse office will gladly supply you with additional information about this motor that adds new thrift to coal production.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse

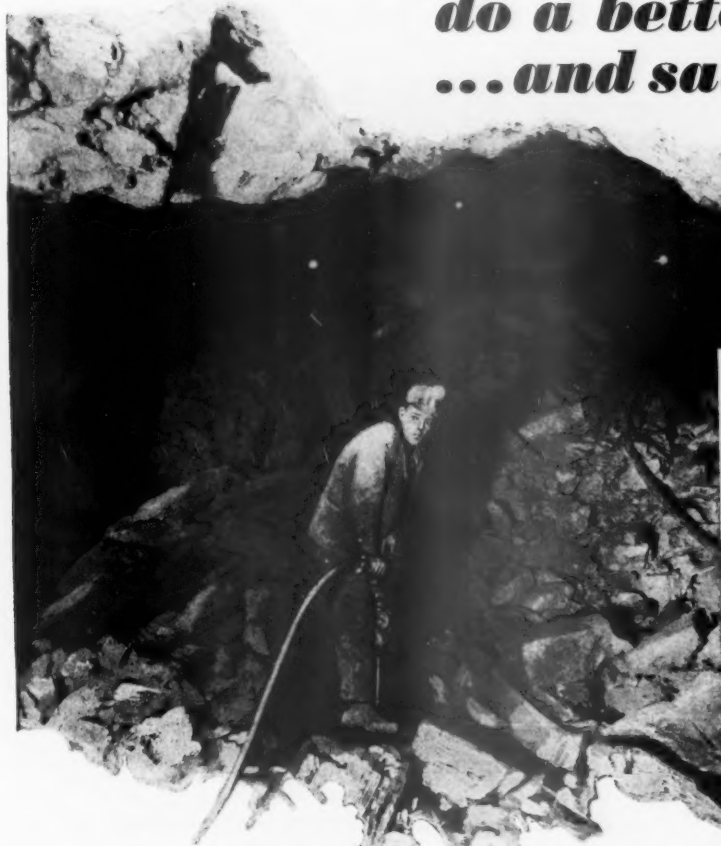


T 31720-A

TUNE IN THE WESTINGHOUSE PROGRAM OVER KDKA, KYW, WBZ AND ASSOCIATED N. B. C. STATIONS SUNDAY EVENINGS.

Let du Pont Explosives

*do a better job for you
...and save you money!*



There is a du Pont Explosive *specifically designed for your job*

IN GETTING the best results in different types of blasting, much depends on the kind of explosive. So when you select an explosive for a given job, you want to know these things: What kind of execution will it give? Is it adapted to this kind of material—to wet work—or dry, open or underground? Is it economical to use?

These are just a few of the questions the du Pont Company has asked about explosives in the years it has been making them. When you specify du Pont explosives, you specify explosives into whose making has gone more than 129 years of experience. You are assured of satisfactory execution, for each du Pont explosive has been made, after thorough chemical research and field tests, to do the most efficient work in the blasting operation for which it is intended.

The du Pont Company publishes a series of bulletins dealing with methods of blasting. We shall be glad to place your name on our lists to receive these bulletins.

E. I. DU PONT DE NEMOURS & CO., Incorporated
Explosives Department WILMINGTON, DELAWARE

DU PONT EXPLOSIVES

For Ore Mining

Du Pont Special Gelatin. An ammonia gelatin made in strengths from 30 to 90%. Dense, plastic, water resisting. Gives off minimum of obnoxious fumes. Not easily ignited by side spit from safety fuse or from delay electric blasting caps. The standard explosive for shaft sinking and underground ore mining.

Du Pont Gelatin. A straight gelatin dynamite of the highest excellence. 20 to 90% strengths. Efficient for all the uses of underground ore mining and first choice for any work under high water pressure.

Gelex A. Similar to 60% ammonia gelatin in strength, plasticity, water resistance and fumes, but of slightly lower velocity and density. Can usually be economically substituted for 60% ammonia gelatin in underground ore mining and in stripping hard rock.

Du Pont Quarry Gelatin. For open work only. Dense, plastic, water resistant. Especially efficient and economical for open-pit mining. Recommended in 25% strength for wet sprung holes in both rock stripping and ore blasting, and in higher strengths for coyote holes in rock stripping.

Du Pont Extra Dynamite. A low-density ammonia dynamite made in strengths A, C, D, F and H, ranging from 115 to 172 cartridges, 1 1/4" x 8", per 50 pounds and from 63 to 20% bulk strength. Used with satisfaction and economy in many underground mines for mining iron ore, lead, zinc and copper, usually in C and D strengths. Also used for both stripping and ore blasting in open-pit mining where holes are dry.

Gelex No. 2. A semi-gelatin dynamite of 45% bulk strength, averaging 120 cartridges, 1 1/4" x 8", per 50 pounds. Cohesive, water resisting and adapted for underground work. Used with economy in mining iron, lead, zinc, molybdenum and gold.

DU PONT



Are You Getting Ready?

Good times are coming in mining industries

Regardless of present conditions, this country will sooner or later enjoy the greatest business expansion ever known.

When the great production race starts, it will be mine against mine as never before. Then the operators whose mines are equipped with the most thoroughly modernized machinery will be the ones to profit most fully.

With this thought in mind, foresighted operators of coal and metal mines are checking over every piece of equipment now—asking themselves many questions about it.

Are these mine cars obsolescent to the point where they should be replaced with modern anti-friction cars of greater hauling capacity?

Has that loader depreciated to a degree that is likely to cause delays resulting

in the disruption of the entire production schedule?

Is this conveyor equipment costing too much for power, lubrication and maintenance?

When the answer is "yes", it will pay you well to do some writing off and to make immediate replacements.

In making such replacements, remember that Timken Tapered Roller Bearings are revolutionizing operating and production costs in all types of mining equipment.

And remember that these savings are so great that it is not uncommon for Timken-equipped machinery to pay for itself in a few months.

Now is the time to put these substantial economies into effect.

When business shifts into high, will you be ready to hold the pace?

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN *Tapered Roller* **BEARINGS**

The MINING CONGRESS JOURNAL

A Monthly Magazine—The Spokesman For The Mining Industry—
Published By The American Mining Congress

VOLUME 17

APRIL, 1931

No. 4

Editorials

The Untried Experiment



advocates of this principle urge that unemployment is our most important industrial and social problem, and that something must be done about it. It is urged that the reserve fund, which business policy sets up in prosperous years to provide for deficits during the lean years, should also provide for the payment of a limited wage to its workers during the same period.

Before embarking upon an untried experiment, it is advisable that we analyze what the proposition advocated means. A very great part of all production is absorbed in food, clothing and transportation. Capital as a whole does not earn as much as five per cent. Actively utilized capital may earn a larger percentage, but the vast amount of capital tied up in unproductive land, unoperated mines and growing timber earns no immediate return.

There are three alternatives proposed. The government dole, the insurance plan whereby industry and worker alike provide the unemployment insurance fund, and the absorption of group insurance by management.

The cost of labor and management in an enterprise is said to constitute 95 per cent of living expenses. What will happen if we are to add to that 95 per cent an amount sufficient to care for the rainy day of both labor and capital? We may safely eliminate the government as a logical factor in the problem. We, as a country, have no desire to emulate our esteemed neighbor, Great Britain, or to arrive at her unenviable situation through the same route.

It is obvious that the fund which will provide for labor's rainy day must come either from the 5 per cent now earned by capital, or from management cost, or both. On the face of it, it would appear that management has received too great a proportion of the earnings of business, but a second view discloses that the risks of new business enterprises have left by the wayside many who otherwise would have been solvent.

Again, without the promise of great reward, the risks will not be assumed by capital and new enterprises will not be developed, and labor will be denied the opportunity of employment.

The soundest proposal looking to a solution of this problem is that of joint responsibility of industry and its workers. The industry that makes it possible for its workers to become stockholders in the enterprise deserves much credit. The industry that has made it possible for its employees to save without too great hardship equally deserves commendation. Both furnish to the wage earner

a self-respecting basis of providing for his future. And any policy that will take from him his responsibility and encourage the spending of each day's wage is based upon error.

It is entirely within the right and perhaps the duty of industrial organization to make provision for unemployment, but it will be a very dangerous thing for the government to undertake such insurance. About all that may be expected of any such proposal will be the destroying of the independence of the wage earner and the substitution therefor of a dependency upon the state which would break down morale and undermine those qualifications which have made for good citizenship.

To remove all distress from the world would be a wonderful accomplishment. To provide for the wants of all people by law, or otherwise, would undoubtedly meet with universal approval. But great care should be exercised in the selection of the means to the end.

Lauding the Depression



FROM a review of the various committees investigating and reporting, it begins to look as if we are determined to become a Congress in our own right, and to settle all of our troubles in a Committee of the Whole. On every hand we are beset with advice. Editorial writers generally are moralizing upon the depression; every meeting of national or local importance stresses the depression; forecasts as to when the depression will leave us are the order of the day, and economists are busy telling us how, why, and when. We are subjected to a continuous analysis, a continuous investigation, and a flood of more or less bromidic advice.

Of course, there is a depression, but perhaps it is not as bad as all of this analysis would cause us to believe. According to Moody's Investors Service, there are 860 leading industrial companies in this country. Of this number 139, or 16 percent, actually reported higher earnings in 1930 than in 1929. Less than half of the total showed decreased earnings. Sixty-one industries showed earnings of more than 25 percent in excess of 1929, while a gain of between 10 and 25 percent was recorded by 25 companies, and an increase of less than 10 percent by 53 concerns. The ability of so many corporations to counteract the effects of the depression is decidedly favorable in Moody's opinion.

As in most depressed periods, mining has felt the slowing-up process seriously. Coal production is off about 20 percent, while the figures for all mineral production show a total reduction of about 18 percent. The Bureau of Mines estimates the value of mineral

products in 1930 as \$4,795,000,000. Notable decrease in total values was recorded for copper, iron, silver, lead and zinc, but the value of gold production increased.

After all, this matter of depression is an individual thing. Each company, each industry, must work out its own problem. And there is every evidence that they are doing so.

Growing Use of Processed Coal



According to a release from the Department of Commerce, "about one-fifth of the present annual output of bituminous coal in this country is now being subjected to chemical processing, and the quantity thus utilized is increasing steadily to meet the demand of a growing population and of an exceptional industrial expansion."

There is no question about the utilization of coal, in the long span of years, and a resumption of increased production over and above the less than 500,000,000 tons produced in 1930. The expanding output of the utilities, even though they do produce a kilowatt hour, with one-half the coal required ten years ago, will take up the march toward additional requirements. The ultimate is not in doubt. But, in the meantime, 305,000,000 tons of bituminous coal were displaced by gas and oil in 1927.

Coal is faced with fierce and devastating competition from other fuels. Gas and oil should enjoy no preference or benefit from the Government that is not accorded coal. Gas and oil are encountering problems new to them, but old to coal. The immediate result will probably be the dumping of vast quantities of oil into competition with coal. Such action may force an even greater percentage of processed coal. But whatever the immediate result, there is no question but that coal will ultimately come into its own.

A Safety Campaign



made in conjunction with Bureau of Mines officials.

Safety work in the coal industry as a national movement began in 1907 as the basis of the efforts of The American Mining Congress to secure the approval by Congress of a bill for the creation of the Bureau of Mines. During the time this bill was under consideration, many Members of Congress believed that the proposed Bureau should be limited entirely to safety work but a broader view prevailed and the mining industry succeeded in preventing this limitation, notwithstanding the fact that safety in mining operations was the principal function outlined for the Bureau's operation.

The agitation leading to the creation of the Bureau of Mines started a nation-wide effort which was taken up by the Bureau of Mines and the publicity which had aroused public sentiment on this question was continued with very marked results.

In 1907 there were 6.7 men killed for each million tons of coal produced. In 1918 the loss was 3.80 per million tons of coal produced, a reduction of more than 43 percent and showing almost a gradual decrease from year to year during that period. The Bureau of Mines has extended its work in this behalf regularly throughout the years.

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The Holmes Safety Association has continued its work through the years which has been made possible by the assistance of the Bureau of Mines. The Holmes Safety Association has developed a system of medals and certificates of honor for special service in safety work so created as to give proper credit for meritorious efforts.

Notwithstanding these efforts, since 1918 the average death loss in bituminous mining per million tons of coal produced has been almost uniform, proving either that the maximum of attainment has been reached, which we do not believe, or that greater safety requires more of public attention and a revival of that cooperation which was given during the first great campaign of public education.

We hail with particular pleasure this enlarged effort. We believe that a comprehensive effort is necessary to keep the importance of safety at all times in the public mind and that these new activities will be of untold value in reducing the loss of life in mining operations as a measure of humanity, and to relieve the mining industry and the consumer of coal of that burden of cost and loss which is a necessary result of mine accidents.

Trucks and Railroads



The editorial in our February issue under the title "Competition for Freight" has called forth violent protest from those who favor the government's development and operation of our inland waterways. Our protestants call attention to the fact that in the state of Iowa, for instance, in the year 1930 the fees collected for license and gas tax amounted to \$24,650,000, while the government aided the railroads to the extent of \$2,500,000, while the state tax paid by all railroads in Iowa amounted to \$7,000,000.

It is also pointed out that the railroads have been subsidized by the government to the extent of 158 million acres of land, and by cash subsidies of something like 500 million dollars and, incidentally, at the same time made valuable adjoining lands, to which they retained title and which without the railroads were valueless.

It is true that the national government and the state did much to encourage railroad building. It was and is a great factor in our national development and wealth. The rivers were with us, at the same time, and unquestionably were utilized successfully and profitably. It seems to us that there is nothing comparable between the waterways and the railways. It is the duty under present law, for the government to light, patrol and condition our ocean ports. The government has fully canalized the Ohio river for its entire length. But it does not follow that the government should set up in competition with its vast railroad system a competitive system subsidized and run by the government. If the inland waterways may be developed, as the railroads were, under a helpful cooperative attitude of national and state governments, it should by all means be done. But the government should not through subsidy destroy the gigantic system of transportation it has evolved at great cost to the country.

In the matter of truck competition it is probable that a large part of the gas tax referred to was paid by the passenger automobile, and that the part of this fund paid by trucks and buses made up but a small part of the total.

It does seem true, as outlined in our February editorial, that the burdens upon the railroads are making it very difficult for them to maintain the effective serv-

ice which in the past has been so great a factor in the development of our industries. The truck and bus service is a great addition to our commercial facilities and its development is to be welcomed but at the same time we must not make it impossible for the railroads to continue that service which has been so important in the past and without which its competitors would fail to meet the full public demand for transportation service.

Industrial Machinery

THE United States spends annually something like two and one-half billion dollars for industrial machinery. Such a figure would indicate that machinery plays a most important role in our industrial development. W. H. Rastall, chief, Industrial Machinery Division of the Department of Commerce, in his annual survey of industrial machinery, announces the amazing figure of five and a half billion dollars as world consumption; the United States, with 6 percent of the world's population, produces and absorbs about 57 percent of this huge total. According to Mr. Rastall, "one worker will produce per annum in the United States \$5,192 worth of product, in Great Britain \$1,432, Germany \$1,527. In other words, with greater facilities, workers produce more."

In a survey recently made by The American Mining Congress it was estimated that the mines of the United States pay annually better than three hundred and fifty million dollars for their equipment, with the market expanding as mechanization takes root.

Our export market is a sizeable one. Foreign sales of mining and quarrying machinery attained a value of nearly \$18,000,000, and Asia and Latin America, since the World War, have absorbed machinery valued at \$1,000,000,000 and \$750,000,000 respectively.

From the above there is no doubting that this is in truth a machine age.

Public Lands

ORIGINALLY, the public domain comprised more than a billion and a half acres. There remain about one hundred and seventy-eight million acres, scattered over seventeen states. The public lands question for generations has been one of grave importance. Wise administration and disposition of these lands was essential to the proper development of the country.

Western states have been most seriously affected by the controversy surrounding these lands. They have opposed most of the things that have been politically proposed as a solution. They opposed the Leasing Act and have steadfastly advocated the states-rights principles, so ardently defended by such old commonwealths as Maryland and Virginia.

Therefore, the report of President Hoover's Committee on Conservation and Administration of the Public Domain is of vast importance to the West in particular and to the country as a whole. The report recommends that the states be permitted to take over and manage and dispose of the public lands within their borders. This would mean that the power now invested in the Department of the Interior would be transferred to the states. It would mean state legislation would be necessary to effect the transfer.

The history of this country is told in the pages of the

public lands records. The policy surrounding these lands has been closely identified with the development of all natural resources—lumber, coal, and minerals of all kinds. It has involved the development of our National Park system and has fostered the well-known homesteader, who characterized the Homestead Act as "Uncle Sam betting 360 acres of land against a filing fee of \$50 that no man can live three years on that land without starving to death."

We have long advocated the most liberal policy in dealing with the public lands. The Leasing Bill was a distinct departure from the policy under which this country has grown great. We still advocate the most liberal method that will develop our public lands, that will make the potential natural resources upon them national assets and at the same time give to the National Government, the states involved, and the citizens who will develop these resources, the fairest deal.

It will be interesting to note the attitude of the country generally to the report of the President's Commission.

Stimulating Enthusiasm

PROGRESS and improvement in coal mining methods are a necessity. In order to accomplish both, requires enthusiasm for the job and clear thinking as to ways and means of improving present methods. This applies to the entire personnel, underground and surface, and management.

Probably there is no one place where this enthusiasm may be engendered more completely than at the convention and exposition held annually under the auspices of The American Mining Congress. From the old slogan of that meeting—"Lower Costs Per Ton"—has emerged the greater idea of cooperation, efficiency and intelligent management. To the program for the convention have been added papers upon "Personnel Management," "Fuel Utilization," and a major theme of "Safety," coupled with efficiency, enthusiasm and cooperation, runs throughout. Steadily as the years have passed, the exposition has become of greater and greater magnitude until today there is no place where such a vast amount of information may be acquired as at the "Cincinnati meeting."

This meeting offers to the management of the coal industry a marvelous opportunity to instill and develop enthusiasm for the job; opportunity to train, encourage and reward the producing personnel; an opportunity for intimate association on the exhibit floor with up-to-the-minute mining equipment—all of which is vital to the survival of the industry.

May 11 to 15 is a Coal Week for Coal Men.

Growing Demand for Increased Penal Institutions

THE growing costs of maintaining our prisons and of supporting courts which try to determine the guilt or innocence of those charged with the violation of law are increasing burdens upon the taxpayer and the consumer, and indirectly are a tax upon every fireside.

The growing laxity in the punishment of offenders is continually adding to these burdens and continually detracting from the safety of the law-abiding citizen. As the penalties for criminal acts are made more lenient and the risks of crime are reduced, we have an increasing

number of criminals who are crowding our penal institutions and a still more rapid growth in the number of hardened criminals who escape detection for many offenses and continue to endanger life.

Gradually we are making it easier for criminals and taking from our citizens the protection which the law should afford, and at the same time adding to the burdens of taxation, in order to provide penal institutions sufficient to care for those who by their course show that they are entirely unmindful of the rights of others. The law-abiding, prudent, industrious citizen is gradually being forced to pay more and more for the support of the lazy, the shiftless and the criminal elements of society.

Oil's Troubles



be arrived at which will pro-rate output to curb over-production and stimulate prices. This meeting probably will not take place until the Federal Oil Conservation Board shall have completed its investigation on supply-and-demand factors in the industry.

Much interest attends the action by the oil producers. Other industries similarly placed, such as lead and zinc and copper, to say nothing of coal, will welcome a clearing of the atmosphere.

The action of the Federal Oil Conservation Board in relation to imports of oil has aroused the ire of the press. It has been accused of inconsistency; of advocating one thing and recommending another. The *Washington Post* takes the Board very severely to task on this point, and advocates the free importation of oil, so that our own reserves may not be depleted. Such reasoning is at least shortsighted. It has about as much merit as the advocating of closing our bituminous mines and importing coal from Russia.

Congress had before it, at its short session, legislation looking to the embargo upon crude oil importation, and the filibuster of Senator Thomas, of Oklahoma, blocked action upon a resolution for the investigation of the oil industry.

What the industry needs, along with coal, and copper, lead and zinc, lumber, and practically all of the natural resource industries, is a sound stabilization plan, which may have the cooperation of producers, states and national governments. In the meantime, the oil producers are agitating in behalf of restricting imports; the Tariff Commission is investigating the differences in the cost of producing foreign and domestic oil; and the Oil Conservation Board is continuing its research.

The outcome is awaited with interest.

Equal Tax Burdens for Competitive Fuels



IN the distribution of our heating and power fuels it is apparent that coal suffers in many ways by comparison with advantages enjoyed by oil and gas. Oil and gas are peculiarly benefited by the fact that transportation is largely through pipe lines. After the cost of the pipe lines is absorbed or capitalized this fuel is delivered almost without cost while coal must be transported by railroad at great cost. This earning makes possible the existence of many railroads which furnish transportation to all other

industries and makes possible lower freight rates everywhere. The ever increasing inroads of natural gas and fuel oil upon the natural territory of coal means, among other things, an increase of freight rates on all products which industry can ill afford.

Oil has a higher use in marine service for which coal is not so well adapted and the ill-advised special favors accruing to oil induce its earlier exhaustion which is not for the public benefit.

The very coal that furnishes so important a part of the revenue of the railroads is suffering through Federal and state tax advantages enjoyed by oil and gas. Under the law gas and oil receive a depletion deduction of 27½ percent of gross income while the average deduction for coal is less than 5 percent. In a like manner gas and oil enjoy depreciation greatly in excess of that granted coal.

In 1927 the gas and oil consumed as fuel reached the startling total of 305,000,000 tons expressed in terms of bituminous coal. It is well known that the use of gas and oil has increased materially in the immediate past and the future trend does not appear encouraging for coal. The revenue loss suffered by the railroads represented by the displacement of 305,000,000 tons of coal at the average figure of \$2.25 per ton equals \$686,250,000 annually and the tonnage displaced is increasing each year. Better combustion methods and a reduction of the tax burden on coal offer the best immediate methods of meeting the competition of oil and gas.

The American Mining Congress believes that Congress will grant justice to the coal industry by granting to it the same allowances for depletion and depreciation which have been recognized as just and fair to the gas and oil industries.

World Leadership



THROUGHOUT the world there is a growing belief that the United States must be the leader in the solution of world problems and more and more are foreign authorities urging that the world is a single economic unit.

This belief is a counterpart of that feeling within our own nation and properly applied with the same variations. The United States is a single economic unit in that there are no business barriers between the several states. This does not mean that the economic development of any state shall be controlled by the national unit except so far as control by market prices, which are effected by the cost of transportation from point to point. The greater this cost, the less must the local producer receive. The various countries of the world must work out their own problems in their own way, and while they should consult with all other nations, it can not be anticipated that any two countries can be upon the same plane until the level of civic life has been attained between those countries.

To say that China and the United States can ever reach a level which will bring about world harmony, anticipates an adjustment of civilization, and a time when the Chinese people shall be raised to a par with the average people of this country. Undoubtedly such a possibility is centuries hence.

The dream of a United States of Europe must be fulfilled before we begin to think seriously of the United States as a part of a world economic unit.

WHITHER AMERICA?

By John E. Edgerton*

THE evidence is plentiful that mining is an extremely hazardous business from both the physical and economic viewpoint. Those, therefore, who are working above ground are exposed to dangers just as those who work in the pits. Until quite recently mining was conceded to be attended by more and greater hazards than any other occupation. But now there is one more hazardous than mining, and that is the occupation, sport or diversion of public speaking. The most discouraging thing about this hazard seems to me to be that the more intelligence with which one speaks the greater are the dangers. Never were there so many poisoned pens and loose tongues ready to assail any view on any question, especially if it be a view that is not colored by radicalism, or that is not sympathetic with whatever the public whim is at the time. Hence it requires a great deal more of courage now to talk publicly on important occasions than any other time in history. One must reconcile himself to the fact that however clearly he expresses himself whatever he says is going to be twisted or misinterpreted and misrepresented by some of the press, and by those who find profit to themselves in disagreeing. But I myself have gotten quite accustomed to these hazards, and I no longer take them into account when considering an opportunity for service. Of course I do not construe that there are any unusual dangers involved in this particular engagement, for I fancy that this audience and I think largely alike on fundamental questions, and occupy substantially the same position on matters of public interest. On the contrary I think that your hazard on this occasion is very much

greater than my own. So my feeling is one of sympathy for you rather than for myself.

FOR 17 months everybody in America has been thinking and talking about what "Andy" calls the "sitchiation." The more we thought and talked about it, analyzed it, and prognosticated concerning it the worse it became, and very naturally so, for the energies and time thus employed were drawn from useful channels. As soon as the soundwaves of the crash in stocks were heard everybody began to run for shelter. Many

discovered that they had no shelter to get under. Some of them had never taken the forethought to provide shelters, while those of many others were blown away by the storm. It is unnecessary, however, to go into any detail as to what has happened during this period of economic inclemency further than to consider some of the fundamental causes for the purpose of a rational charting of our future courses. The important question now is whither are we going, and not whence came we?

To answer that question intelligently one must look at our situation as a whole, and his vision must be clear. Economics can not be divorced in his thought from morals, and neither of them from politics and our social life. In all of these respects together must a nation move forward if its advance is not to be interrupted by periods of instability calling for readjustment. Progress comprehends all of the elements of spiritual and material development, for civilization can move in only one of two directions, either backward or forward. Generally speaking, it seems to me that the period of suspended economic animation through which we have been passing was the result of our abnormal and unharmonious

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Before Sixth Annual Industrial Development Conference, Southern Division, The American Mining Congress, Louisville, Ky., March 17, 1931.

Potomac Park from the south steps of the United States Treasury, Washington, D. C.



growth. We have been developing physically so much faster than we have morally and mentally, that our avoirdupois had become too great for our neglected social structure, and it simply crashed through. We have thought too much in terms of extensive as distinguished from intensive development, while our senses of value and of direction became dull and warped. When a man's business grows faster than he does it is doomed to collapse. That is exactly what has happened in America, and business is now waiting for its managers—the people, to catch up with it in their growth.

THERE are just two points from which one may contemplate the situation. One of them is from the viewpoint of a pessimist, and the other that of an optimist. There are enough statistics available to sustain either point of view as far as the mind of man can weigh and interpret facts. It is very largely, therefore, a question of what one actually wants to believe. If his digestion is bad, or if his economic sense is developed all out of proportion to his moral sense, or if he takes a short-sighted view, he will undoubtedly look upon the situation with gloomy forebodings. If, on the other hand, his liver and his heart are right, and he understands and believes in those eternal spiritual forces which govern the trends of all life, then he will face the future not only hopefully, but confidently. In other words, in such periods of instability as the one in which we find ourselves, the most reliable of all stabilizers is faith—faith in God and faith in ourselves.

While I myself have the faith that America and the world are going to continue their advance toward higher planes of living, I am thoroughly cognizant of the fact that in our pathway there are bewildering obstacles and serious dangers. I do not fear the ultimate outcome of civilization's struggle, but I do apprehend the terrific cost which mankind has to pay for its errors. Let us consider our own country separately for a moment, not forgetting, however, that neither ours nor any other nation can regard itself as independent in any sense from the rest of the world. Never again, in my opinion, shall we get as far ahead of our sister nations economically or in any other vital respect as we did during the first third of the twentieth century. However odious or strange it may be to us, we shall be compelled in the future by physical, if by no other circumstances, to consider ourselves a part of an organic whole which embraces the world. Miraculously improved communication and transportation facilities, particularly within the last decade, have so cemented the nations of the earth together and revolutionized human relationships, that the term "readjustment"

has a world instead of a merely national significance. This fact complicates as never before the problem of readjustment to radically changed conditions. Heretofore, in other words, when there was a disturbance in our economic equilibrium we could look for and more easily find the causes within our own national boundaries, and could very much more quickly and effectively restore our own lost balance. But now to a very much larger extent, the attitudes of other nations react upon our own national life and require from us new understandings and considerations, and an abandonment of our attachment to the principle of complete isolation. I do not mean to suggest that we should sacrifice any vital part of our national identity, or to allow ourselves to become involved in "entangling foreign alliances," against which we were warned by the Father of our Country. But I do mean that a progressively changed world requires a larger and broader view of national and racial inter-dependence. We can not expect, therefore, to "get back" to where we have been before, because that would be retrogression. We can not expect to restore normality by exactly the same processes and methods as those heretofore employed. We shall have to think through our difficulties as distinguished from trying to remove them by physical or mechanical means.

I DO not see anything in the present situation that calls for abandonment of our national, political, or economic philosophy, or those sound principles which are embodied in our national Constitution and the institutions set up by it. Our problem is that of building new structures on old foundations which have demonstrated themselves to be sufficient for all the requirements of an advancing civilization. In my opinion it is not "things" which need to be changed nearly so much as people. We do not need any new systems. We need new methods of operating the systems we have, and a new adaptation of policies to principles. Improvement in the social order to meet the conditions of modern life does not require any disturbance of the fundamentals within it. Those who are most vociferous in their demands for changes in the social order are generally thinking in terms that are strange to the purely American conception. They are thinking about substituting some other system such as that which prevails in Russia. Clever artists, for the most part, they paint false pictures of the brotherhood of men, and undertake to convince the unwary that the ends of civilization can be quickly achieved through political and economic processes. They would accomplish the world's redemption by physical force, ignoring the principles of quality, of opportunity, and

of individual responsibility. They think in terms of the mass instead of the individual. They would take by force from him that hath—however honestly obtained, and give to him that hath not—however undeserving he may be. That would destroy the incentives to individual voluntary effort and the opportunities for individual initiative. They put their faith in government instead of in God.

These observations will suggest communism to the average mind. In this connection let me say that I am not afraid of self-confessed, blatant communism, even though it has grown alarmingly in this country within the last few years. The chief danger to our national structure is not at that specific source. It rather lies among those of our more respectable citizenship, who either carry the germs of communism unconsciously in their clothes, or who believe in it, and yet do not have the courage to openly confess their faith. Some of them call themselves Democrats; some of them Republicans; some of them Progressives; and some of them Independents, or other deceiving names. But except for those deceptively described and highly respectable elements, communism could have never become naturalized in our country. Even as late as 15 years ago the known presence of a communist would scarcely have been tolerated in any community of America. The very suggestion of communism was repulsive, and such riotous events as those which have occurred recently in some of our cities would not have been possible. But bolder and bolder has it become as it has been apologized for and encouraged by many native Americans occupying positions of honor in our country, and in private life. The church and our educational institutions have become tainted with it in spots, and it has been getting more and more fashionable to revolt against the restraints of law and the constraints of our American institutions. Such un-American and anti-American organizations as the so-called "American Civil Liberties Union" have come into existence to defend and foister these ideas and ideals of life, which are thoroughly repugnant to the American theory of government and conception of political and religious liberty. This cancerous growth of alien philosophy has been going on because the more substantial elements of our citizenship have been too busy getting and spending to pay attention to their patriotic duties. Proceeding upon the theory that all change is progress, regardless of its character or extent, and availing themselves of the opportunities supplied by a neglectful citizenship, the disingenuous forces of destruction have become more and more effectively active until they now constitute a real menace to the

securities of our national future. The recent and other economic depressions have furnished additional golden opportunities to these apostles of discord and profiteers in discontent. Radicalism becomes more popular as it becomes more profitable to its evangelists. Like a coral polyp, it thrives only in the turbulent waters of unhappy economic situations. Using another figure of speech, it is a sort of mental nettle-rash emanating from economic indigestion. It can not, however, be cured by the application of legislative poultices, or by mere ranting about it, or oratorical condemnations of it. The problem is to discover its bases and remove them by the patient employment of common sense, embracing the utilization of human experience.

THE clear issue before our nation is whether or not the people will reassert and maintain the mastery of the government that was established to be their servant, or whether they will continue to yield to the increasing encroachments of political power upon the domains of private prerogatives and initiative. In other words the burning question is, are we not only incapable, but have we the necessary will to govern ourselves. That invisible issue lies beneath nearly all of the major legislative proposals in the United States Congress and state legislatures. Many of these proposals reflect an increasing tendency among the people to look to government for their relief from economic and other pressures. More and more the public treasury is being generally regarded as the medium through which wealth is to be equalized among the people through legislative distributions. Not only have public funds almost ceased to be regarded as a public trust, but through their appropriations to unwarranted causes the areas of political influence and power and exploitation are being continuously widened and expanded. These political expansions of power are almost invariably at the expense of individual liberty and the domain of private enterprise. The Muscle Shoals and Soldiers' Bonus bills, recently vetoed by President Hoover, with the approbation of most of the people of this country, are two conspicuous examples of the growing disposition to make our government what it was never intended to be by its architects. It must be recognized, however, that the most of these dangerous measures are at the behest of powerful groups, who are thinking in terms of class or sectional interests rather than of justice and of the nation's advancement, as a whole. After all, the Congress of the United States moves little faster in these strange directions than it is encouraged to do either by well organized and extremely active minorities, or by



the indifference and apathetic attitudes of majorities. As a rule those who are most indifferent to what is going on, and who are doing the least about it except to talk, are those who have to "pay the freight." Excepting only the war Congress, which should not be regarded in any sense as a standard of comparison, the Congress just adjourned was by far the most expensive one in the nation's history. It appropriated in excess of ten billions of dollars. We all remember the shock in the early days of this century when it was proclaimed that the nation was falling heir to a billion dollar Congress. While our wonderful progress and the resulting requirements of government have undoubtedly accounted for a part of these nine billions of dollars of difference in the cost of government within the last three decades, it is equally true that an indeterminate but a very large part of it is the cost of our political decadence. Nearly 15 cents out of every dollar that a citizen now earns in a year go into the government's coffers, and the amount is increasing not in direct proportion to our natural progress, but more directly in proportion to the extravagancies of political incompetency and to the lessening interest of our people in the affairs of our government. The average citizen feels that he has about fulfilled all of his obligations of citizenship when he belongs and contributes even meagerly to some organization which claims to look after the interests of his group at Washington and at other seats of government.

SO I SAY that the character of our government in all of its units, and the character of its legislative product is not going to change any faster than the people themselves change. If industry in all of its branches, and business in all of its ramifications, do not themselves voluntarily correct their errors, and repair the deficits made clear by accumulating experiences, government is going to continue to try to do the work for them, whether it makes a good job of it or not. Every economically unhappy

person is either an actual or a potential radical. Naturally his desire is to change conditions. Whether the fault be his own or not, he naturally is prone to attribute his trouble to external circumstances. His disposition, therefore, is to join almost any movement that promises a change of almost any kind. The great job before the intelligence and enlightened conscience of the nation is to see that every citizen has a fair opportunity to earn his economic, as well as spiritual salvation. If he has not the opportunity he ultimately ceases to feel his sense of individual responsibility. "Hoggishness" in our country must be curbed. It is primarily our great national evil. It is not confined to the groups who have or seem to have, but it is quite as visible among other groups that care less for position but more for condition. My observation is that there is about as much selfishness in cotton as in silk stockings, in overalls as in broadcloth. There is no monopoly on human fallibility or human selfishness. I insist therefore that at the root of every economic and political problem we have there is a moral problem which must first be solved. The obligation of contribution to every problem is in direct and absolute proportion to an individual's opportunities and capacities to make it. It is time that we were calling a halt in this country upon group, class and sectional intolerances. There is too much of what is vulgarly called "buck passing" among them all. As long as this spirit continues there can not be and will not be any such thing as stabilization. The people themselves must be stabilized before there is any possibility of stabilizing conditions. If, therefore, all who have been busy analyzing conditions and causes, getting up statistics and expressing opinions, would stop long enough to indulge in a bit of self-examination, they would find, in my opinion, the roots of the trouble. Individual reform necessarily precedes collective reform, and national improvement can proceed no faster than improvement in the individual parts of the whole.

REGIONAL MARKETS

By E. F. Gerish*

ALTHOUGH no one would think of planning a single campaign to cover the entire Continent of Europe, disregarding the pronounced differences and living habits and tastes among the various European countries, many business men treat the United States as a unit market in planning their campaigns. The United States has an area more than three-quarters as large as that of the entire Continent of Europe and considerably greater than that of Europe with Russia subtracted. It has as wide a variety of industries and occupations and as many different kinds of people, even though the differences may not be so pronounced.

The greater weight which a business man will give to the problem of planning and launching a campaign in Europe than to a similar campaign in the United States is attributable, almost altogether, to the differences in his point of view.

He realizes his lack of familiarity with the diverse customs, requirements, and language of the European peoples. On the other hand, he assumes a familiarity with the United States which he does not possess and he does not realize, speaking idiomatically, that he "doesn't know the language" of many of the sections or classes that he is trying to sell or influence.

This vast market of over 122 millions of people increased a little over 16 percent over the last decade. If you do not believe that there are regional differences, bear in mind that nearly 50 percent of the population is concentrated in the 14 northeastern states located north of the Ohio and east of the Mississippi Rivers; 21 percent in the 12 states east of the Mississippi, and south of the Ohio, or about 15 percent of the area; 23 percent in the 19 states between the Mississippi and the Pacific Coast states in 60 percent of the area; and 7 percent in 3 states on the Pacific Coast

in 11 percent of the area. The population density ranges from less than 1 per square mile in Nevada to 644 per square mile in Rhode Island.

The industrial market is highly concentrated in seven of the northeastern states having produced about 60 percent of the total value of manufactured products for the country. One-quarter of the manufacturing establishments are located in 6 counties and another quarter in 39 counties; or one-half are located in 45 counties. One-quarter of the materials used in manufacturing are bought by establishments in eight counties and another quarter in 29 counties, or one-half of the materials are used in factories in 37 counties.

THE function of the Domestic Regional Division may be said to be to determine so far as possible along trade lines, what the several markets are, how the existing machinery of distribution serves them, and to determine what indexes exist that will serve as a yard stick to measure them. Where are the consumers? What do they consume and in what quantity? In order to help answer these questions, we must know something of the mechanism which stimulates and supplies the consumers' requirements. Such knowledge is necessary for cooperation with the production function in creating effective demand for the goods to be produced and in the co-ordination of effort required to assure the production, sale and delivery at the time and place desired of goods which are satisfactory to the consumer at prices which will insure the development of maximum demand at least expense with reasonable profit.

Purely as an administrative convenience in order to make it possible to handle this vast domestic market, the country has been divided into nine regions that have, in so far as it is possible, to make such divisions common properties in distribution and marketing machinery. Without mentioning the component states, these regions are: New

England, Central Atlantic, Southeast, midwest, Gulf Southwest, West Mid-Continent, Central Northwest, Pacific Northwest, and the Pacific Southwest. Ultimately it is planned to set up a separate unit for each one of the nine regions into which the country has been divided for the survey work to secure the data periodically and to conduct further studies of specific distribution problems in each area.

THE Gulf Southwest survey in many respects is a radical departure from our former procedure in survey studies. Heretofore, all the field material necessary was gathered in one coverage, namely, information on merchandising, transportation, banking, consumer buying habits and other subjects. This resulted in a year or more being spent in the field and at least two years being spent in writing the reports. In order to cut down the time involved and to make the information in the survey reports more current and of greater use, it has been decided to break the Southwest up into a series of studies allowing three months for the field work of each study and approximately three months for the preparation of each report. This means that the Gulf Southwest Survey and future survey studies, instead of coming out in one or two volumes, will come out in a series of small readily usable reports.

So far to date, a study of the Distribution of Dry Goods, a study of the Production and Distribution of Petroleum, one on the Production and Distribution of Cotton and one on the Distribution of Hardware in the Gulf Southwest have been made. The next study to be undertaken will be on the distribution of furniture. This same study will be applied to the Midwest area and to the West Mid-continent comprising the states of Colorado, Wyoming, Kansas, and Nebraska which we hope to open next July.

Perhaps it might be well to illustrate the type of information revealed in these studies by a few selected illustrations from the hardware study in the Gulf Southwest. What type of wholesaler does the business? The strictly wholesale house does 81.4 percent of the total volume of business and the combination wholesale-retail house does 18.6 percent of the business. A triangle formed by Oklahoma City, Memphis and San Antonio contains 70 percent by number of all "wholesale" establishments of the Gulf Southwest. Three circles, one in the Ozark Mountains, one in Eastern Louisiana and Mississippi and one in west Texas contains 98 percent by number of all "wholesale-retail" establishments.

Where is there wasted sales effort? Motley County in west Texas has 5 re-

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Before Sixth Annual Industrial Development Conference, Southern Division, The American Mining Congress, 1927.

tail stores and 22 wholesalers are trying to get the business. Incidentally Motley County has a total population of 6,800, no oil or minerals, a crop amounting to about 2,400,000 odd dollars and only 35 people file an income tax return. McCurtain County, Oklahoma, has 5 retail stores and 15 wholesalers are trying to get the business. Many other examples are cited.

If you want to sell sporting goods, your chances are best in the down-town city store, next best in the small town store and there is about an equal chance in the suburban store or the country implement store. On the other hand, if you want to sell paints, oils, and brushes, your best chances are in the suburban stores. You have about equal chances in the down-town city stores and country implement stores and the least chance in the small town store.

About 59 cents of the consumer's dollar goes to the manufacturer; 14 cents to the wholesaler, and 27 cents goes to the retailer. The average wholesale customer buys about \$575 worth per year, sends in 26 orders per year, and the average order is about \$22.53.

There are also many interesting facts brought out in the dry goods study. For example, 15.1 percent of the total retail sales reported were in bargain departments or bargain basements. Out of 376 stores reporting, 91 stores had leased departments representing a total of 270 leased departments. The sales of 20 departments accounted for over 51 percent of the total sales and 10 of these departments for something over 35 percent of the total sales.

AT THE beginning of my talk, I told you that we not only were interested in finding out what were the various markets and how the machinery of distribution worked in serving them, but that we were also interested in developing yardsticks that might be used in measuring their possibilities. Our experience has been similar to that of a number of manufacturing concerns in that the by-products of our work in some instances, have become among our most important contributions. Reference is made to the Market Data Handbook of the United States.

All of you are familiar with the type of salesman training that takes the prospective salesman and pumps him full of enthusiasm and facts about the product he is to sell, puts a price book in his hand and with a pat on the back, he is told that the world is his prospect. The salesman no sooner reaches the chill of the outside air than the words "the world is my prospect" die upon his lips and he immediately is confronted with the problem, "Whom shall I see first?" Many business concerns find themselves in no

different situation when it comes to planning their market and sales campaign.

Julia O'Grady and the Colonel's Lady may be sisters under the skin, but it is not likely that they will buy the same house furnishings or be able to pay the same for dresses; though they both may want the same style. The problem is to find, so far as possible, the Julia O'Gradies and the Colonels' Ladies in the great mass of consumers.

The Market Data Handbook of the United States is an attempt to place in the hands of business various types of statistics that will be helpful in estimating any given market. This publication comprising eight tables presents approximately 400 different items that are of value in this sort of work. This publication brings together in one place, the available information by counties arranged alphabetically by state, the information which is needed by the market analyst.

Although this publication contains some information which can be secured from other sources, a large part of the figures given are entirely new. Many of these have been secured by the tabulation of new data from the Bureau of Census, the Bureau of Mines, Bureau of Fisheries and the Department of Agriculture, as well as through cooperation with non-governmental organizations. The response to this publication has been enthusiastic and there has been a wide application of it in the development of various markets.

We are now getting out a supplement to this book bringing the various figures up to date. Inasmuch as consumers goods are largely sold on an emotional appeal and industrial goods are sold on a rational appeal and usually through quite different channels, we are planning to get out two separate books—one for the consumers market and one for the industrial market.

What might be termed other by-products of the regional surveys are the

"External Trade of New England" and "Transcontinental and Intercoastal Trade in the Pacific Southwest in 1926." These two studies were an attempt to see what would be necessary in the inauguration of a statistical service that would furnish better information on the movement of commodities in the several areas of our country.

LAST year the railroads of this country handled about 447 billion ton miles of freight. The question immediately arises as to the amount, the types, and kinds of commodities handled. Where do they come from—their origin? Where do they go—their destination? The inauguration of such a service requires much preparation, but we are encouraged to believe that for certain parts of the country it will be possible to secure such information and we hope eventually it may be extended to all states. We are now gathering for the 48 states, information on the movements inward from without the states and the movements outward from within the states and intra-state movements for 156 different growths of commodities.

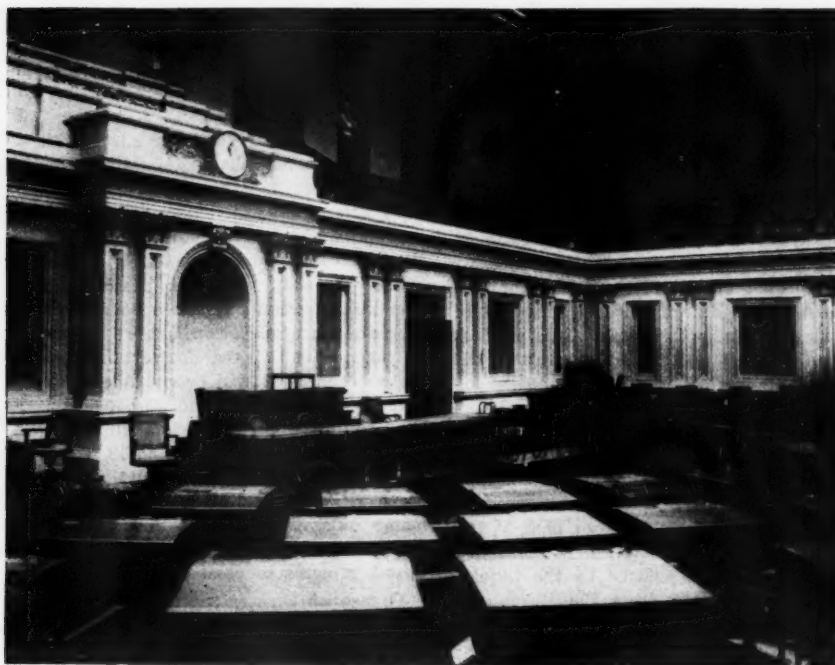
To use an illustration as to the purpose of this type of work, the ideal would be to be able to take several economic areas in a country and draw lines about them and segregate them so to speak, from each other regarding them much as one would a foreign country, such as Great Britain, Denmark or Holland. The problem would then be to determine what is produced within each of the several areas and then shipped out to other areas or domestic exports, if such a term may be used for lack of a better terminology and find out what was brought into the area from without or domestic imports. It would then be possible to determine a balance of trade for these several areas and arrive at a better understanding of the distribution process involved.

There is a trend in greater appreciation of the fact that the efficiency of distribution methods and agencies is susceptible of improvement. There is an appreciation that production may more nearly be synchronized with consumption. To this end, attention is being focused on the demand for information on three essential requirements:

1. The evaluation and allocation of the possibilities of each local market for the consumption of goods by commodity lines.
2. The efficiency of retailing and wholesaling outlets in supplying these goods and services.
3. The adjustment of production and distribution planning to the efficient retailing of the goods in accordance with the effective demand that can be developed in each local market.



LEGISLATIVE REVIEW



Silence reigns

in the halls of Congress and will probably continue until December 7, when the new Seventy-second Congress convenes. Following a stormy session from December to March, marked by frequent clashes over legislative and governmental policies, the Senate and House wound up the business of the Seventy-first Congress, and the halls of the Capitol will be practically deserted until the new Congress opens next winter. Of course, should an emergency require, the President has the power to call an extra session, but this is not now considered likely.

Important legislation occupied the attention of Congress to the close of the session on March 4, and much of it fell by the wayside, being lost in the usual last-minute rush. One of the final measures to be acted on was the Muscle Shoals, Alabama, nitrate and power project, but as the measure as finally approved by Congress authorized government operation of these works, President Hoover vetoed the legislation and was sustained by the Senate. Another bill vetoed by the President contemplated government aid to the States in the establishment of employment agencies, but as Congress had adjourned before the measure was disapproved by the President, no further opportunity was afforded for Congress to pass on the proposition.

A bill to change the meeting time of the sessions of Congress from December to January of each year passed both Houses, but died in the conference committee because of inability of that body to agree on the final draft of the measure, which by House action proposed to limit the second session of Congress in odd years to a four-month period, the Senate holding out for an unlimited time for this session.

Mining legislation occupied the attention of Congress up to the close of the session. In fact, the Senate session end was characterized by a determined effort by Senator Thomas, of Oklahoma, to secure an investigation of the oil industry by a Senate committee as a basis for legislation at the next session to meet depressed conditions in the domestic industry either through a tariff or an embargo against imports. Failing to secure action by the Senate on the matter, Senator Thomas spoke at great length at several night sessions of the Senate and held the floor, to the exclusion of other business, until the session ended at noon on March 4. During its closing moments, however, the House authorized the Tariff Commission to investigate the differences in cost of production of domestic and foreign oil and as Senate action was not necessary the commission will make the inquiry. The House also passed a resolution for an investigation

by its Ways and Means Committee of the economic situation in the oil, coal, manganese, asbestos and other industries, growing out of Russian imports and demands for their exclusion, and while the Senate Finance Committee reported the resolution, the Senate did not act on the matter, and the investigation was not authorized. The House likewise passed a bill advancing from January 1, 1932, to April 1, 1931, the prohibition in the tariff law against the importation of goods mined or produced by forced or indentured labor, but the Senate Finance Committee decided not to take up the matter and it likewise failed.

With a view of later legislation on the subject, the Senate passed a resolution presented by Senator King, of Utah, for an investigation by the Tariff Commission as to the differences in the cost of production of domestic and foreign lead.

The Seventy-first Congress, during the two years of its existence from March 4, 1929, to March 4, 1931, had a record in considering a vast quantity of legislation. During this period more than 35,000 bills and resolutions were introduced, reports were made on 4,818 bills and 1,524 laws were enacted. Of these laws, however, only 1,009 were of a public nature, the balance covering private claims, etc. The statistical record follows:

LAWS ENACTED

Laws enacted—Public laws, 869; public resolutions, 140; private laws, 512, and private resolutions, 3.

Bills, etc.—House, 17,373 bills, 394 resolutions, 536 joint resolutions, 46 concurrent resolutions introduced; 2,946 committee reports made and 801 documents received. Senate, 6,276 bills, 495 resolutions, 265 joint resolutions, 39 concurrent resolutions introduced, 1,872 committee reports made and 330 documents received.

For the first time in a number of years, several senatorial seats are being contested, growing out of the recent election. These contests are: J. T. Heflin against John H. Bankhead, from Alabama; Einar Hoidale against T. D. Schall, from Minnesota; and G. M. Pritchard against J. W. Bailey, from North Carolina.

Vermont will this spring elect a Senator to succeed the late Senator Greene. Warren R. Austin and Stephen Driscoll are the candidates. Senator F. C. Partridge, who was temporarily serving by appointment of the governor, lost the nomination to Mr. Austin in a primary

election. Wisconsin will also hold a special election for a successor to the late Representative Cooper, who died March 1, after a long service in the House.

The only new investigating committee authorized by Congress at the recent session was a Senate Committee consisting of Senators Wagner, of New York; Glenn, of Illinois, and Hebert, of Rhode Island, which will inquire into and report on unemployment insurance systems.

Congress passed and the President approved a law authorizing the establishment of a mining experiment station of the Bureau of Mines costing \$350,000 on land at College Park, Md., to be donated by the University of Maryland.

With a view of improving and stabilizing the price of silver, the Senate passed a resolution presented by Senator Pittman, of Nevada, asking the President to negotiate with foreign countries or to call an international conference looking to agreements as to the uses and status of silver as money and to prevent silver price depressions.

Senator Broussard, of Louisiana, failed in an attempt to have an investigation made into cooperative investigations by the Bureau of Mines in connection with a report of the bureau on anti-freeze products. Another investigation which failed was one sought by Senator Oddie, of Nevada, into administration of the anti-dumping act and the relation of American steel interests to imports of Russian manganese.

With a view of improving the farm situation, Senator Thomas, of Oklahoma, had the Senate authorize the Department of Agriculture to investigate the mineral resources under farm lands and means looking to their co-operative development.

Congress passed and the President approved a law applying the unit development system to oil and gas operations under the leasing law.

Tax proposals presented to Congress included a bill by Representative Garber, of Oklahoma, at the request of the legislature of that state, to permit state officers to have access to personal income tax returns the same as is now allowed to corporation returns.

The House passed but the Senate did not act on a bill for a 90 percent restriction of immigration for the next two years.

The following is a summary of recent legislation before Congress:

S. 5220. Mr. Tydings (Dem.) and Mr. Goldsborough (Rep., Md.). This bill authorizes an appropriation of \$350,000 for the construction of an experiment station of the Bureau of Mines at College Park, Md., on land to be donated by the University of Maryland, to be utilized by members of the administrative staff

of the Bureau at Washington for preliminary tests. *Enacted into Law.*

S. Res. 442. Mr. Pittman (Dem., Nev.). This resolution requests the President to "enter into discussion or negotiation with governments looking to the suspension of the policy and practice of governments of melting up or debasing silver coins and sales by governments of silver, and that he take such other and further action in the premises as he may deem necessary to eliminate the abnormal fluctuations and depressions in the price of silver." The resolution also requests that "the President call or obtain an international conference to the end that agreements or understandings may be obtained with respect to the use and status of silver as money." *Passed by the Senate.*

S. 6103. This bill provides for the issuance of a new 25-cent silver piece in 1932 bearing a likeness of George Washington in commemoration of the 200th anniversary of his birth. *Enacted into Law.*

S. 5677. This bill provides for the coinage and sale of 500,000 medals commemorating the 150th anniversary of the surrender of Lord Cornwallis, at Yorktown, Va. *Enacted into Law.*

H. R. 17258. Mr. Kelly (Rep., Pa.). This bill proposed to provide \$50,000 additional for the year beginning July 1, 1931, for technologic study by the Bureau of Mines of methods of mining, treatment and utilization of nonmetallic minerals, other than coal and oil. *Appropriations.*

S. J. Res. 262. Mr. Dill (Dem., Wash.). This resolution proposed the establishment of a joint congressional committee to investigate damages in the United States by fumes from the smelter of the Consolidated Mining and Smelting Company, at Trail, British Columbia. *Foreign Relations.*

PROPOSED INVESTIGATIONS

H. J. Res. 525. Mr. Hawley (Rep., Oreg.). This resolution proposed an investigation by the House Committee on Ways and Means as to economic conditions in the oil, coal, lumber, manganese, asbestos and agricultural industries. *Passed by House and reported by Senate Finance Committee.*

H. J. Res. 523. Mr. Crowther (Rep., N. Y.). This resolution proposed an investigation by the Senate Finance and House Ways and Means Committee into economic and labor conditions in Russia, with particular reference to the production of manganese, coal, oil, lumber and other products. *Rules.*

S. Res. 484. Mr. Oddie (Rep., Nev.). This resolution proposed an investigation by the Senate Judiciary Committee into the administration by the Treasury Department of the anti-dumping law and the relations of steel companies in the

United States to Russian manganese imports. *Expenses Committee.*

S. Res. 377. Mr. Thomas (Dem., Okla.). This resolution directs the Department of Agriculture to investigate the mineral resources underlying farm lands with a view to their development through cooperative agencies. *Passed by the Senate.*

S. J. Res. 253. This resolution proposed to appropriate \$110,000 for the expenses of an International Geological Congress to be held in the United States in 1932. *Passed by the Senate and reported by the House Committee on Foreign Affairs.*

H. R. 16701. This bill proposed to grant certain land to Colorado for the benefit of its School of Mines. *Reported by Public Lands Committee.*

H. R. 4811. Mr. Kelly (Rep., Pa.). This bill proposed to appropriate \$100,000 to enable the Bureau of Mines to manufacture one gram of radium for treatment of war veterans in government hospitals. *Reported by Mines and Mining Committee.*

H. R. 14248. Mr. Colton (Rep., Utah). This bill provides for prospecting permits and leases for asphalt, gilsonite, elaterite and other like substances in Utah. *Reported by Senate Public Lands Committee.*

H. R. 15258. This bill permits the development of mineral resources in the southeast quarter section 4, township 43 north, range 82 west, in Wyoming. *Enacted into Law.*

S. Res. 490. Mr. Broussard (Dem., La.). This resolution proposed an investigation by a committee of five Senators as to activities of the Bureau of Mines involving toxicologic and other studies of products not related to mines or mining, and cooperative studies and reports thereon.

H. R. 17140. Mr. Goss (Rep., Conn.), and S. 6178. Mr. Bingham (Rep., Conn.). These bills proposed to regulate the use and sale of wood alcohol. *Judiciary.*

H. R. 17005. This bill proposes the establishment of the Isle Royale National Park, in Michigan, which includes an area in which extensive copper mining operations were conducted in ancient days. *Enacted into Law.*

H. R. 11969. This bill provides for the withdrawal of certain land to protect the water supply of Los Angeles, Calif., but reserves the minerals to the government with the right of prospecting and mining. *Enacted into Law.*

H. R. 12094. This bill conveys certain land to Alabama for educational purposes, but reserves their mineral contents to the government with the right of prospecting and mining. *Enacted into Law.*

H. R. 16517. Mr. Kendall (Rep., Pa.). This bill would have excluded after April

1, 1931, goods mined or produced by convict, forced or indentured labor, except such goods which are not produced in the United States in sufficient quantity to meet the domestic requirements. Under present law they will be excluded after January 1, 1932. *Passed by the House.*

H. Res. 391. Mr. Hawley (Rep., Oreg.). This resolution directs the Tariff Commission to investigate and report at the next session of Congress as to the differences in cost of production of domestic and foreign crude petroleum, fuel oil, gasoline and lubricating oils. The inquiry is to be confined to production costs in foreign countries which exported in 1929 and 1930 more than two million barrels of such products. *Passed by the House.*

H. R. 17261. Mr. Garber (Rep., Okla.). This bill proposed to limit imports of crude oil to 16,000,000 barrels per year and to prohibit imports of refined products during 1931 and 1932. *Ways and Means.*

S. 5814. Mr. Walsh (Dem., Mont.). This bill would subject the construction of pipelines for the importation into the United States of natural or artificial gas to the approval of the Interior Department. *Passed by the Senate.*

H. R. 17339. Mr. Hoch (Rep., Kans.). This bill would subject pipeline companies to the jurisdiction of the Interstate Commerce Commission. *Committee on Interstate Commerce.*

S. 6161. This bill authorizes the Missouri Valley Pipeline Co., of Iowa, to construct a pipeline bridge across the Missouri River between Nebraska and South Dakota. *Enacted into Law.*

S. 6253. This bill authorizes the Missouri Valley Pipeline Co., of Iowa, to construct a pipeline bridge across the Missouri River at Sioux City, Iowa. *Enacted into Law.*

H. R. 3820. This bill provides that oil and gas lands reserved from stock-raising homestead entries must be within the geologic structure of a producing field. *Enacted into Law.*

S. 6128. This bill applies the unit development system to oil and gas operations under the leasing law. *Enacted into Law.*

S. 6169. This bill provides that minerals produced on the lands of the Five Civilized Tribes of Indians, in Oklahoma, after April 26, 1931, shall be subject to state and federal taxes. *Passed by the House and Senate.*

H. R. 11820. This bill authorizes a patent to a homestead entry to J. R. Murphy, of Nashua, Mont., with a reservation of oil and gas in the lands to the government. *Passed by the Senate.*

S. J. Res. 182. This bill would forbid the construction of tank facilities by the Sun Oil Co., on the shores of the

Potomac River, near the District of Columbia, in order to preserve scenery along the Washington Memorial Parkway. *Passed by the House.*

TAX RETURNS

H. R. 17093. Mr. Garber (Rep., Okla.). This bill would give access to personal income tax returns by the proper officers of any state upon the request of its governor. *Ways and Means.*

H. J. Res. 503. Mr. Frear (Rep., Wis.). This bill proposes to increase income tax rates on incomes from \$10,000 to more than \$500,000, to meet the cost of the soldier bonus loan legislation. The bill provides that in the case of a bona fide sale of mines, oil or gas wells, or any interest therein, where the principal value of the property has been demonstrated by prospecting or exploration and discovery work done by the taxpayer, the portion of the tax imposed by this bill attributable to such sale shall not exceed 16 percent of the selling price of such property or interest. *Ways and Means.*

S. Res. 441. Mr. King (Dem., Utah). This resolution provides for an investigation by the Tariff Commission as to the differences in the cost of domestic and foreign lead in 1928, 1929 and 1930. *Passed by the Senate.*

S. 6249. Mr. Nye (Rep., N. Dak.). This bill would authorize the Federal Trade Commission to approve voluntary trade practice agreements by industries. Should such agreements be subsequently found to lessen competition, unreasonably restrain trade or create a monopoly, the commission could, by proper proceedings, revoke them. *Judiciary.*

S. 6264. Mr. Nye (Rep., N. Dak.). This bill proposes to establish a Federal Trade Court of 10 judges, with one in each of the 10 judicial circuits of the country, to have jurisdiction over suits under the anti-trust laws. *Judiciary.*

H. R. 17360. Mr. Stobbs (Rep., Mass.). This bill would amend the anti-trust laws by providing that restraint of trade prohibited thereunder shall be construed to mean only such restraint of trade as, having regard to the interests of producers, workers, consumers and distributors, shall be to the detriment of the public. The bill points out that court decisions under the law have "disregarded, ignored or negated the preservation and welfare of American industries against excessive competition which often causes ruinous competitive warfare, thereby injuriously affecting workers, producers, distributors and merchants in the wholesale and retail trades of industries." The bill recites that there should be "a proper safeguarding of American industries, workers, and all other persons engaged in such industries, from the effects produced by excessive or ruinous competition." *Judiciary.*

S. J. Res. 49. Mr. Norris (Rep., Nebr.). This resolution proposed the government operation of the Muscle Shoals, Ala., nitrate and power project. *Passed by Senate and House; vetoed by the President; veto sustained by the Senate.*

S. 6278. Mr. Kean (Rep., N. J.). This bill proposes to transfer operation of the Muscle Shoals, Ala., nitrate and power project to the States of Alabama, Georgia and Tennessee, the government to receive payment at the rate of 3 percent of the fair value of the property per year and to have the right to retake the property in event of national emergency. The proposal is in line with a recommendation of the President. *Agriculture.*

S. 6199. Mr. McKellar (Dem., Tenn.), and H. R. 17186. Mr. Taylor (Rep., Tenn.). These bills propose an appropriation of \$10,000,000 for construction of the Cove Creek dam, in Tennessee, in connection with the Muscle Shoals, Ala., nitrate and power project. *Appropriations.*

H. R. 16976. This bill provides that revenues from power projects on irrigation projects shall be devoted to payment of construction of the power project, to the individual reclamation project, and the balance to the general reclamation fund. *Reported by Irrigation Committee.*

H. R. 16215. This bill authorizes the sale of surplus power developed under the Grand Valley reclamation project in Colorado. *Enacted into Law.*

S. Res. 486. Mr. Johnson (Rep., Calif.). This bill would authorize the Irrigation Committee to investigate as to proposed legislation regarding the use of the waters of the Sacramento, San Joaquin and Kern Rivers in California for irrigation, navigation, flood control and power development. *Reported by Irrigation Committee and referred to Expenses Committee.*

H. R. 17344 and 17345. Mr. Esterly (Rep., Pa.). These bills propose a survey by the War Department as to the feasibility of developing power by constructing dams on the Delaware River near Delaware Water Gap and on the Schuylkill River near Hamburg, Pa., with a view of developing local industries and to check the migration of industry and population from those localities. *Rivers and Harbors.*

H. R. 17346. Mr. Leavitt (Rep., Mont.). This bill proposes experiments and investigations to determine the value of forests in regulating stream flow in the watersheds of the Mississippi and Colorado Rivers for navigation, irrigation or power use. *Agriculture.*

H. J. Res. 500. This resolution proposed a 90 percent restriction of immigration to the United States during the

two years beginning July 1, 1931. *Passed by the House.*

H. R. 16296. This bill proposes to exclude and expel alien communists from the United States. *Reported by House Immigration Committee.*

H. J. Res. 356. This resolution proposes to exclude aliens from the count of population of the country on which the membership of the House of Representatives is based. *Reported by House Judiciary Committee.*

S. 6224. Mr. Bingham (Rep., Conn.); H. R. 17199. Mr. Goss (Rep., Conn.), and H. R. 17282. Mrs. Kahn (Rep., Calif.). These bills would require the War Department, in the purchase of its supplies, to contract for those which are produced or manufactured in the United States. *Military Affairs and Executive Departments.*

H. J. Res. 514. Mr. Crosser (Dem., Ohio). This resolution proposes a constitutional amendment giving Congress the power to reduce the number of hours of service per day for which contracts of employment may be lawfully made. *Judiciary.*

S. Res. 483. Mr. Wagner (Dem., N. Y.). This resolution provides for an investigation and report December 7 next by a committee of three Senators into unemployment-insurance systems in use by private interests in the United States and by foreign governments. *Passed by the Senate.*

S. J. Res. 261. Mr. Wheeler (Dem., Mont.). This resolution proposed an appropriation of \$100,000,000, to be expended by the President, for the relief of unemployed persons in the United States. *Expenses Committee.*

S. 3060. Mr. Wagner (Dem., N. Y.). This bill proposed the establishment of a national employment system in co-operation with the states, under federal allotments. *Passed by Congress and vetoed by the President.*

S. Res. 460. Mr. LaFollette (Rep., Wis.). This resolution provides for an investigation by the Senate Committee on Manufactures of a proposal to establish a National Economic Council. *Passed by the Senate.*

S. 6215. Mr. LaFollette (Rep., Wis.). This bill proposes the establishment of a National Economic Council of 15 members appointed by the President from nominees suggested by organizations representing the industrial, financial, transportation, labor and agricultural interests of the country, to serve four-year terms. The council would study the general economic and business condition of the country; consider problems affecting the economic situation of the United States and its citizens, formulate proposals looking to the solution of such problems, and report on economic questions to the President, Congress and in-

terested economic organizations. *Manufactures.*

H. R. 17241. Mr. Sproul (Rep., Kans.). This bill would create an Old Age Aid Bureau in the Department of Labor for cooperation with the states for relief of the aged. *Judiciary.*

S. 6196. Mr. Jones (Rep., Wash.), and H. R. 17201. Mr. Johnson (Rep., Wash.). These bills would authorize the establishment of a uniform retirement system for employees of interstate railroads under the Interstate Commerce Commission. *Interstate Commerce.*

H. R. 17238. Mr. Celler (Dem., N. Y.). This bill would authorize the creation of a World Commerce Corporation, for the purpose, among other things, of controlling reserves of natural resources that will supply ships with return cargoes and stabilize prices of raw materials which the industries of the United States must obtain from abroad and to operate fuel stations. *Judiciary.*

H. R. 17260. Mr. Free (Rep., Calif.). This bill would authorize the Shipping Board to create a corporation of ship-owners for the purpose of stabilizing reasonable charges for the transportation of freight and passengers between the United States and foreign countries. *Merchant Marine.*

S. 3491. Mr. Blaine (Rep., Wis.). This bill proposed to regulate the issuance of stocks or other securities in the District of Columbia by the Public Utilities Commission of the District. *Passed by the Senate.*

S. Res. 305. This resolution suggests that the State Department shall not approve or disapprove the issuance of foreign investment loans in the United States on the ground that it should not involve the government in any measure of responsibility therefor. *Passed by the Senate.*

H. R. 17185. Mr. McFadden (Rep., Pa.). This bill would create a Federal Capital Issues Board of six members, appointed by the President, to pass upon the issue of foreign or domestic securities in the United States in excess of \$100,000. *Banking and Currency.*

S. Res. 408. Mr. Brookhart (Rep., Iowa). This resolution proposed an investigation and report by the Senate Banking Committee into cooperative credit laws and systems in order to provide for a more effective use and control of credit for cooperative enterprises as distinguished from competitive, and the desirability of a cooperative banking system with respect to the use of its facilities for curbing and preventing speculation and encouraging and developing cooperative organization. *Reported by Senate Committee on Expenses.*

H. R. 17169. Mr. James (Rep., Mich.), and S. 6193. Mr. Reed (Rep., Pa.). These bills, recommended by the War

Department, would authorize the sale of the Washington-Alaska military cable and telegraph system to the highest bidder. *Military Affairs.*

S. 2676. Mr. Couzens (Rep., Mich.). This bill would authorize voluntary consolidations of railroads. *Interstate Commerce.*

H. J. Res. 519. Mr. Parker (Rep., N. Y.). This resolution proposed an investigation and report next December by the Interstate Commerce Commission into the various agencies engaged in interstate commerce, including pipelines. *Reported by Committee on Interstate Commerce.*

S. J. Res. 250. Mr. Fess (Rep., Ohio). This is similar to the foregoing. *Reported by Committee on Interstate Commerce.*

H. R. 5568. This bill proposed to establish uniform requirements affecting government contracts. *Reported by House Judiciary Committee.*

H. R. 12922. This bill provides for the issuance of medals of honor and awards to government employees for distinguished service in science or for voluntary risk of life and health beyond the ordinary risks of duty. *Passed by the House.*

H. R. 12284. This bill authorizes an appropriation of \$650,000 for the construction of a vessel for the Coast Guard for work of rescue and assistance to vessels on Lake Erie. *Enacted into Law.*

H. R. 16159. This bill appropriates \$15,000 for the expenses of a Pan-American Commercial Conference to be held in Washington, D. C., this year. *Enacted into Law.*

S. Res. 480. This resolution provides for an extension of time for settlement of claims of Americans against Mexico growing out of destruction of their property during revolutions in that country. *Passed by the Senate.*

S. Res. 475. Mr. Caraway (Dem., Ark.). This resolution continues the committee, of which the Senator is chairman, which has been investigating lobbying before Congress, requiring it to make a final report at the next session. *Passed by the Senate.*

S. Res. 416. This resolution provides for the continuance during the next two years of an investigation by the Senate Indian Committee into Indian affairs. *Passed by the Senate.*

H. R. 17194. Mr. White (Rep., Me.). This bill would authorize the Clark Coal Co. to sue the government in the Maine District court for damages to one of its coal carrying vessels by collision with a government vessel near the Cape Cod Canal in 1919. *Claims.*

S. 4353. This bill authorizes the Orange, Texas, Car and Steel Co. to sue the government in connection with a government construction contract during the war. *Enacted into Law.*

INDUSTRIAL DEVELOPMENT

Conference

ENCOURAGING reports of progress in the development of the mineral and other resources of the Southern States, coupled with appeals for renewed activities along the line of surveying and charting the resources of the South, marked the sixth annual Industrial Development Conference held by the Southern Division of the American Mining Congress in cooperation with the Kentucky Progress Commission at Louisville, Ky., March 16 to 18. The conference was marked by an exhibit of the Kentucky Progress Commission illustrating the mineral and other resources of the states and the results of recent cooperative efforts with the American Mining Congress in advancing their development. An interstate governors' conference was held at which the governors of the southern states or their special representatives reported on proposed plans for furthering the industrial development of the South.

Invitations to hold the 1932 sessions of the conference were received from St. Augustine, Fla.; Charleston, S. C.; Memphis, Tenn.; Biloxi, Miss., and New Orleans, La. John L. Wilkes, of Jacksonville, was elected chairman of the Southern Division; Dr. Henry Mace Payne, secretary, and the following were elected to the board: Clarence E. Abbott, of Birmingham, Ala.; J. H. Hand, of Yellville, Ark.; W. S. Campbell, of Kentucky; E. W. Vennard, of Shreveport, La.; James H. Skewes, of Meridian, Miss.; J. W. Harrelson, of Raleigh, N. C.; W. W. Smoak, of Walterboro, S. C.; Walter F. Pond, of Tennessee; Charles L. Baker, of Houston, Tex., and LeRoy Hodges, of Richmond, Va.

Captain R. M. Watt, of the Kentucky Utilities Corporation, of Pineville, member of the Kentucky Progress Commission, opened the conference as chairman of the board of governors of the Southern Division, and welcoming addresses were delivered by Mayor W. B. Harrison, of Louisville; M. A. Erskine, of the Southern Bell Telephone and Telegraph Co., and Judge Huston Quin, managing director of the Kentucky Progress Commission, to which response was made by J. F. Callbreath, secretary of the American Mining Congress.

In his address to the conference as chairman of the Board of Governors of the Southern Division, Captain Watt stated that "a real coordination of industrial development is taking place throughout the South, and that the American Mining Congress is playing a significant part in reducing the varying factors of state activities to a common denominator." Continuing, Captain Watt said: "The American Mining Congress is engaged in a campaign for the industrialization of the South. It is working for the establishment of industries based on natural resources, both metallic and non-metallic, and to establish industries that will supply the people of the South with home-produced necessities." Captain Watt reviewed the cooperative work recently conducted by the American Mining Congress and the Kentucky Progress Commission, and stated that similar activities are now being undertaken in Arkansas and Louisiana.

"The opportunity knocking throughout the South today is the economic development and utilization of its own resources," Captain Watt said. "The South needs an awakening to its possibilities and then it needs additional capital to develop and utilize its enormous mineral wealth."

Captain Watt then briefly reviewed the outstanding industrial developments in the southern states, touching on those in Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, Tennessee, Texas, Virginia and North Carolina.

Reviewing conditions in Tennessee, Major Rutledge Smith, member of the Board of Governors of the Southern Division for Tennessee, stated that coal mines have produced reasonably well, and that while the profits were reduced, the mines were kept in good condition and are now again fairly active. Zinc and copper mining continued fairly active in the state, although there was a decline in the production of iron ore. He reported that the sandstones in the Cumberland plateau region of Tennessee are being developed for building materials and are being shipped in the export trade.

Reporting for the State of Arkansas, Judge J. H. Hand, of Yellville, stated



John L. Wilkes, of Jacksonville, Fla., new elected chairman of the Southern Division

that the cooperative work being conducted in that state by the American Mining Congress with state and commercial organizations is "already showing good results." He reported also on the development of important power projects in the state.

Dudley V. Haddock, of Little Rock, manager of the Arkansas State Chamber of Commerce, said the future industrial development of the South is a matter of ascertaining the needs of consumers, the extent of resources, and putting the brains of its people to work.

LeRoy Hodges, of the Virginia State Chamber of Commerce, reported developments of importance in the titanium minerals in Nelson and Amherst Counties, Virginia, by the Southern Mineral Products Corporation and interest in the development of magnesian limestones and dolomites in the Valley of Virginia.

James H. Skewes, of Mississippi, said a new clay products company has begun operations at Charleston, Miss.

C. E. Abbott, of Alabama, stated that 26 new industries were begun in that state in 1930, of which 18 were located in the Birmingham district. Mr. Abbott stated that proposed construction in Alabama this year will cost \$28,510,565, including \$10,000,000 for plant extensions.

Renewed interest in the iron ores of eastern Texas was reported by Dr. C. L. Baker, of Houston. He stated that \$259,000,000 is being spent on constructing natural gas pipelines from Texas to other states. He feared, however, that petroleum refining would be transferred

from Texas and other American ports to Europe.

Gold prospecting in North Carolina was reported by Colonel J. W. Harrelson, director of its conservation and development department. Mining companies have taken over four properties in the state and one is building a plant. A New York company has taken over the Fontana Copper Company and plans to build a concentrating plant and electrify the mine. Another company is building a mill for manganese operations. Another northern company will build a plant for the concentration of kyanite. Plans are under way for developing four large kaolin deposits.

Reporting on the progress of industrial development in Georgia, R. F. Monsalvatge, engineering chemist of Atlanta, stated that there had been important progress in power projects and in the extended use of natural gas, fullers earth, clays, kaolin, granite, and marble. New construction in power projects cost \$16,000,000, while \$30,000,000 was expended in piping natural gas from Louisiana. There were investments of a million dollars in the development of the ceramic industry in Georgia. The production of granite in Georgia during the year was valued at \$2,225,000, and these products were shipped to practically every state and to Canada and Cuba. The marble output of the state was valued at \$3,777,275. "Each year sees an advance in the development of the state," he said.

Extension to all of the states of surveys as to the origin and destination of commodities produced or consumed therein or shipped therefrom was favored by E. F. Gerish, chief of the Domestic Regional Division of the Department of Commerce. He stated that the department is gathering for all of the states information on the movements in and out of the states on 156 different commodities. By this method, he said "it will be possible to determine a balance of trade for these several areas and arrive at a better understanding of the distribution process involved."

"The efficiency of distribution methods and agencies is susceptible of improvement," said Mr. Gerish. "Production may more nearly be synchronized with consumption. Information is being sought on three essential requirements: evaluation and allocation of the possibilities of each local market for the consumption of goods by commodity lines; efficiency of retailing and wholesaling outlets in supplying these goods and services; and adjustment of production and distribution planning to the efficient retailing of goods in accordance with the effective demand that can be developed in each local market."

Mr. Gerish stated that the purpose

of the department is to determine the nature of regional markets, existing machinery of distribution for their service and indexes that will serve to measure them. "Such knowledge is necessary for cooperation with production in creating demand for goods and in the coordination of effort to assure the production, sale and delivery at the time and place desired of goods satisfactory to consumers at prices which will insure development of maximum demand at least expense with reasonable profit," he said.

Mr. Gerish outlined distribution surveys which have been made or are projected for various commodities in nine regions into which the country has been divided for this purpose, one of which studies has covered the production and distribution of petroleum.

John B. Reynolds, of Chicago, director of industrial development of the Middle West Utilities Company, favored the establishment of industries in small communities as production costs are increased by traffic congestion, higher wages and taxes and larger capital investments in large cities. "The future will see a continued increase in this trend of industry to decentralize," he said, in stressing the necessity of small communities in surveying their raw materials, transportation facilities and tax rates.

In declaring that all forms of transportation should be subjected to the same regulation and taxation, Edward S. Jouett, vice president and general counsel of the Louisville and Nashville Railroad, cited the following factors which had contributed to diminishing railroad revenues: transportation of gasoline through pipelines; increased use of electric lines for transmitting power, which formerly involved the transportation of coal; government operation of vessels on inland waterways and shipment of transcontinental tonnage through the Panama Canal.

Speaking on the relationship of geological and industrial surveys, Dr. W. R. Jillson, state geologist of Kentucky, stated that the coordination between these surveys in the South "has been demonstrated to be a very close and practical adventure." "The mineral stores beneath our southern hills and valleys is rich and varied," he said. "Industry and population are growing in the South as countless opportunities long unsuspected are revealed, seized upon and developed to advantage. In a broad country such as ours, not alone in the quickening South, it is not difficult to envision a gradual expansion during the next several decades of this new cooperative geological-industrial survey experiment which has been tried and proven so successful by the State of Kentucky. Arkansas has already seen the moving

finger write and has the nucleus of a similar industrial survey under way. The prospect broadens as the opportunities thus afforded for industrial expansion in the states become more apparent."

The various sessions of the conference were presided over by members of the board of governors of the Southern Division, including, in addition to Captain Watt, the following: James H. Skewes, of Mississippi; John L. Wilkes, of Florida; Maj. Rutledge Smith, of Tennessee.

At an interstate conference on coordination of industrial development addresses were made by Gov. Flem D. Sampson, of Kentucky; former Gov. Bibb Graves, of Alabama; W. W. Smoak, vice chairman of the South Carolina Natural Resources Commission; H. C. Couch, of Arkansas, president of the Louisville and Arkansas Railroad; Thad Holt, managing director of the Alabama Industrial Board; John W. Lewis, Jr., secretary, Louisiana State Chamber of Commerce; Col. LeRoy Hodges, manager, Virginia State Chamber of Commerce; Col. J. W. Harrelson, director, North Carolina Department of Conservation and Natural Resources; Dr. Walter F. Pond, state geologist of Tennessee; and M. L. Margenau, of Missouri.

Dean F. Paul Anderson, of the College of Engineering of the University of Kentucky, was toastmaster at the annual dinner, held the evening of March 17, at which S. Livingston Mather, of Cleveland, president of the Cleveland-Cliffs Iron Company, and of the American Mining Congress spoke on the interrelation of mining and industry. Education and industry were discussed by Dr. Frank LeRond McVey, president of the University of Kentucky. In an address on "Whither America?" J. E. Edgerton, president of the National Association of Manufacturers, said that if industry does not voluntarily correct its errors and repair deficits made clear by accumulating experience, the Government will try to do the work.

In pointing out possibilities of greater development in the South Frank Gould, president of the *Manufacturers Record* of Baltimore, said the abundant coal and natural gas resources of the South are "beginning to be more thoroughly investigated for their possible chemical utilization."

On March 18 the delegates enjoyed a scenic trip to Fort Harrod, Shakertown, Dix Dam, Frankfort, and through the Bluegrass section of Kentucky as guests of the Consolidated Coach Co., with luncheon at Dix Dam as guests of the Kentucky Utilities Company, and an industrial tour through Louisville as guests of W. S. Campbell, general manager and chief engineer of the K. and I. T. Railroad.

The Effect of ROOM WIDTHS on Mechanical Loading Production

By G. B. Southward

IN the systems of mining used in the different fields of the United States with the new types of loading equipment the width of the working place has a great variation. This ranges from rooms less than 20 ft. wide to a face or wall several hundred feet long. The factors or considerations which have determined the width of the working places in hand loading are quite different from those which determine this width in mechanized loading and it will be the purpose of this article to discuss how widths of the working place affect the production of the loading machine. This will refer particularly to the mobile type unit which moves from place to place loading out a number of faces during a single shift.

In hand loading the character of the roof may determine the width that the rooms are driven but another factor, and in some mines the governing factor, is the distance that a man can move and load the coal with a hand shovel into a mine car. That is to say that a weak roof or bad top may cause a room to be narrowed down to the point where the top can be more easily supported. Under strong roof, however, with hand loading there are few mines where the rooms are driven to the maximum width that the top would support as there is a limit, in hand loading, beyond which any additional width is a disadvantage rather than an advantage. This is because of the extra work required to shovel the coal across the face to the mine car.

In long wall mining with hand loading, where the face or wall is several hundred feet long, the tracks are arranged to reach the face at frequent intervals which are also determined by the length which the coal can be moved economically by a hand shovel. These intervals are approximately equal to the room widths in room and pillar mining. Consequently longwall was not designed to increase the tonnage per working place but was designed as a method for extracting all of the coal in a seam and to do this with a successful roof action.

The application of machines to the loading operation has brought about a different set of requirements from hand

loading. The room widths are no longer restricted to the distance that a man can hand shovel and the time lost moving the loading machine from one working place to another makes it advantageous to produce as much tonnage from one place as is possible. It is generally believed therefore that for a mechanical loading operation a wider working place has considerable advantage over a narrower place and in some mines the width has been increased to the point where the cost of supporting the roof constitutes a considerable item of expense. This may or may not be justified and in order to illustrate what effect an increased room width has on the production of a machine there are four sketches and two curves submitted with this article.

The sketches in this figure show varying widths of working places from narrow rooms to long faces. These sketches represent the two standard mining systems—room and pillar and long face—although both systems are now being modified to the extent where it is sometimes difficult to classify some particular method as a modified room and pillar or a modified long face operation. For the purpose of this discussion a system is considered to be a long face method when the working places reach a width which will allow the car loading track to be placed parallel to the advancing or working face.

Using this method of classification, *Figures 1 and 2* are room and pillar mining since the cars are placed one at a time at the loading machine. *Figure 1* shows comparatively narrow rooms with a single track and *Figure 2* shows the width increased to a point where double tracks are required. *Figures 3 and 4* represent long face mining as their track is parallel to the loading face so that several cars can be placed in a trip at the loading machine.

The curves accompanying these figures show how the production loaded per shift is affected by changing the room width. The lower curve marked "A" plots this relation for mining by the room and pillar system where the cars are placed one at a time as illustrated in *Figures 1 and 2*. The upper curve marked "B"

plots the relation where the mining is in wide rooms or on long faces where the cars can be loaded in the trip as illustrated by *Figures 3 and 4*. Both these curves are plotted to the same scale and on the same ordinates so that in addition to illustrating the relative production by different room widths in the same system they also show a comparison between the tonnage mined by the two systems.

In studying these curves it should be kept in mind that they are prepared and presented for the sole purpose of comparing different widths of working places and are not to be misunderstood as including any other factors such as height of seam, car capacity, etc., which affect the production in actual mining. For this reason they do not represent actual tonnages that could be mined in each case taking all operating factors into account. In order that the curves shall be comparative it is assumed that the methods of operation and machines used are the same for all room or face widths and that the loading is done by a mechanical loader of the mobile type. This may either be track or tractor mounted.

For the purpose of comparison an average standard performance with the loading machine is taken as the basis for the production rates shown in the curves. This assumes that a loading machine working in a 25-ft. room as shown in *Figure 1* will make eight cleanups or complete room cycles in an eight-hour shift. On this assumption a room cycle would be completed in 60 minutes and if 10 minutes is allowed for the time required to move from one place to another the loading in the room would be done in 50 minutes. Since the room width is 25 ft. this means that the loading would be at the rate of two minutes for each linear foot of face. In an eight-hour shift, since eight rooms are loaded out, there would be 200 linear feet of face completed. This value of 200 ft. is plotted on the curve as representing the production from a 25-ft. room and the same loading rate and the same time of moving is used for calculating all the production values for the other room widths as plotted in curve A.

On curve A which shows the operation in room mining with single car changes it will be seen that the production increases very rapidly from zero until a room width of 25 ft. is reached. Beyond this point the curve begins to flatten and after a 50-ft. room is reached any additional increase of width does not give much more production. The solid portion of the curve covers room widths from 12 to 50 ft. which represents the practicable limits for this system of mining. The dotted portions are simply to complete the curve from zero to a theoretical maximum of 240 ft.

From the preceding it seems evident that the room and pillar system should be confined to comparatively narrow workings and for wide places the system should be changed so that the productions as shown in curve "B" will apply. When a room width has reached 50 ft. it is possible to lay the track parallel to the working face so that the cars can be loaded in trips. This is illustrated in Figure 3. With this arrangement single car changes would be eliminated, and the loading rate would be correspondingly increased.

In room mining when the cars are placed one at a time it is usual to find that about 50 percent of the time that the machine is in a room is lost in making the car changes. In Figures 3 and 4 where the cars are placed in a trip this time loss is greatly reduced and it is assumed in curve B that the loading rate of the machine would be increased to a speed of 1 ft. of face per minute. At this rate a 50-ft. room would be loaded in 50 minutes and with 10 minutes allowed for the move to another room the complete cycle would require 1 hour. On this basis 8 rooms or

400 ft. of face would be loaded out in an eight-hour shift. This value is plotted for the production of a 50-ft. width in curve B and the productions for other face widths are calculated on this same basis.

This curve shows that the production for the shift increases fairly rapidly until the face length has reached 100 ft. From this point on the curve begins to flatten and there is not a great deal of gain in production beyond a 200-ft. length. It should be kept in mind that this is referring to an operation with a mobile type machine and not to conveyor or scraper mining where the loading unit is set for one working face only.

These curves "A" and "B" bring out three interesting points. First (in curve A) that in room and pillar mining where the cars are placed one at a time there is no particular advantage gained by increasing the room width beyond 50 ft. Second (comparing curves A and B), that beyond a width of 50 ft. the gain in production is very material, where the track can be laid parallel to the face for trip loading. Third (in curve B), that with a mobile type ma-

chine there is no great advantage in an extremely long face as the production with several shorter faces is very nearly equal to the production from a single long face.

In several previous articles the subject of roof action has been discussed and some of the difficulties which are encountered in supporting the top for long faces have been described. It is well known that the cost of holding the top increases with the width of the face—within certain limits at least. If we refer to Curve B we will see that the production from three 150-ft. faces with a mobile type machine would amount to 450 linear feet of face per shift. If only one face were used the production would amount to 480 ft. In other words there is only a loss of 30 ft. by using short faces which in a 5 or 6-ft. seam would amount to about 30 tons. This small tonnage gain would certainly not justify any considerable amount of extra expense for roof support. This shows very clearly that the possibilities of short faces should not be overlooked in considering a mining plan for mechanized loading.

FIGURES 1 AND 2

Mechanical loading in room mining with single or double track with single car placement at the loading machine



Figure 1

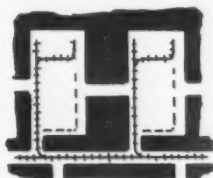


Figure 2

FIGURES 3 AND 4

Mechanical loading in wide rooms or long faces with mine cars placed in trips at the loading machine

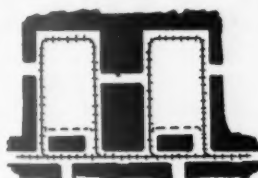


Figure 3

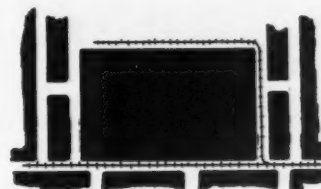
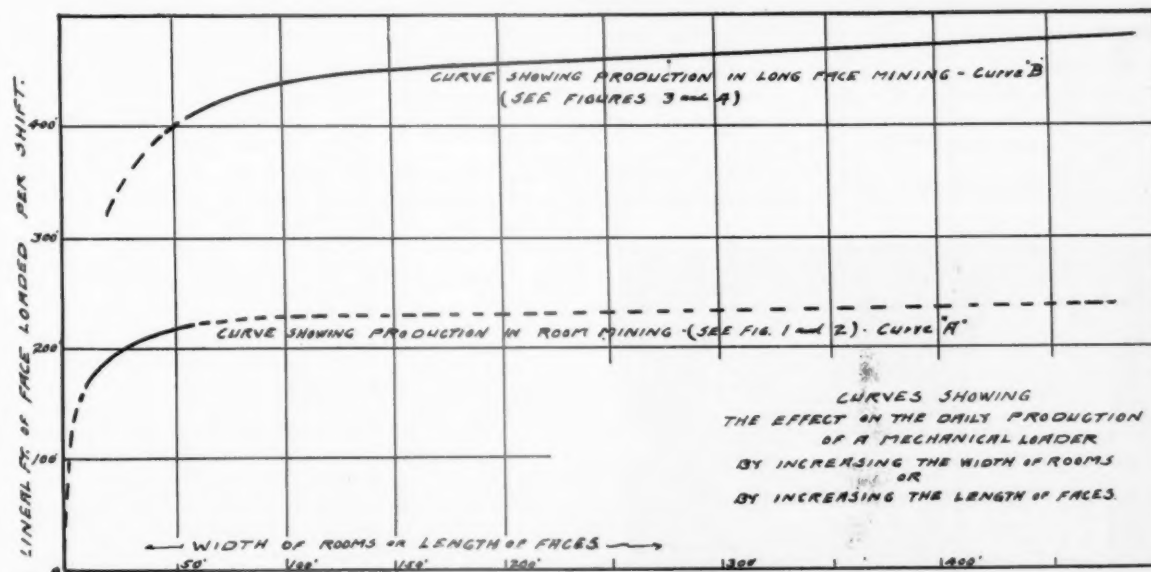
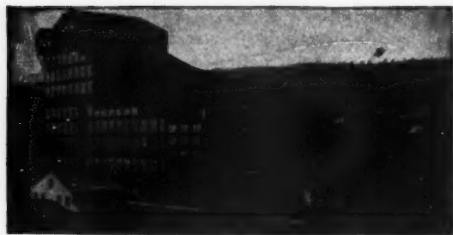


Figure 4



Curves and sketches showing the relation between width or length of the working face and the tonnage produced with mechanical loading

PRACTICAL OPERATING MEN'S DEPARTMENT



COAL

NEWELL G. ALFORD

Editor

Practical Operating Problems
of the Coal Mining Industry



*Conveyor taking briquettes
from below press to outside
storage bins*

BRIQUETTES from CARBONIZED LIGNITE

By Newell G. Alford and Edward Prostel*



THIS plant using the Lurgi Low Temperature Process on lignite, is located about 3 miles southeast of Dickinson, N. Dak., and approximately .75

mile south of the main line of the Northern Pacific Railroad. It is owned and operated by the Lehigh Briquetting Company.

This plant was closed down about June 1 because it was not operating

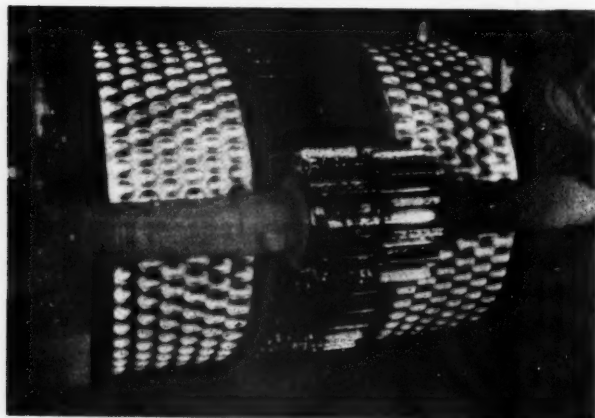
* Superintendent, Lehigh Briquetting Company, Dickinson, N. Dak.

economically. The briquettes were sold while the plant was operating at \$10 per ton f. o. b. Lehigh, with a cost of \$10.36.

It is expected that the finances will be reorganized and new equipment added, so that the plant will resume in the near future.

The gas for starting the predryer and carbonizer is made in a producer with a capacity for 25 tons of lignite, in which about 15 tons is charged. It is a cylindrical producer with a rotating grate, having a combined gas cleaner and water seal.

A belt conveyor 36 in. wide takes lignite to a magnetic pulley, for removing tramp iron, from which it passes through a heavy disc type crusher, made in Prague, reducing it to 4-inch lump. From here the crushed lignite is elevated 63 ft. to the top of the building, where it is delivered over a Hammer vibrating screen, the $\frac{3}{4}$ x 4-in. lump passing to two bins above the predryer, each with 75 tons capacity. The $\frac{3}{4}$ -in. screenings



The roll of the briquetting press

pass to the power plant. Lignite is taken from the 75-ton bins by a conveyor to a charging car which shuttles automatically over the two open shafts on the top of the predryer, distributing the lignite as it moves.

The drying process is not separated from the carbonizer. Predrying and carbonizing are done in the same unit in a continuous process without any moving parts or gates between the two operations. After passing through the predryer, the coal travels by gravity through open chutes into the predryer. The hot gases travel through the lignite without any heating from the outside.

This one predryer has two chambers from which the moisture is taken off in the form of vapors and burned gases through a duct leading to a stack. The predryer is equipped with explosion doors. The dried lignite passes down from the predryer through 8 chutes into the carbonizing chambers. Gas from distillation is mixed with that from heating, giving a mixture with a low heat value (150 B.t.u.) which is used as fuel in the predryer and carbonizer, making a temperature of about 450 degrees Fahrenheit. If the feed increases above the normal rate of about 8 tons per hour, the temperature inside the predryer can be raised to about 500 degrees Fahrenheit. It requires about four hours to predry the initial charge after which the operation is continuous.

The gas from carbonization passes through a tar washer or disintegrator, the tar is stored and later distilled, the gas being cooled in a cooler is then passed back to the predryer and carbonizer for use as fuel.

The average time of carbonization for this particular grade of lignite, from its charge to discharge as char, is approximately 16 hours.

Electric pyrometers in the carbonizer are most vital to proper control of the process since the temperatures are far more sensitive than the pressure. Successful operation depends upon maintaining constant temperatures in both the predryer and carbonizer. The carbonizing temperature is maintained at about 1,100 degrees Fahrenheit. The pressure is only slightly above atmospheric; it is



The turbine, condenser and switchboard of the power room



The magnetic pulley, crusher and storage bins for crushed lignite prior to charging in the pre-dryer

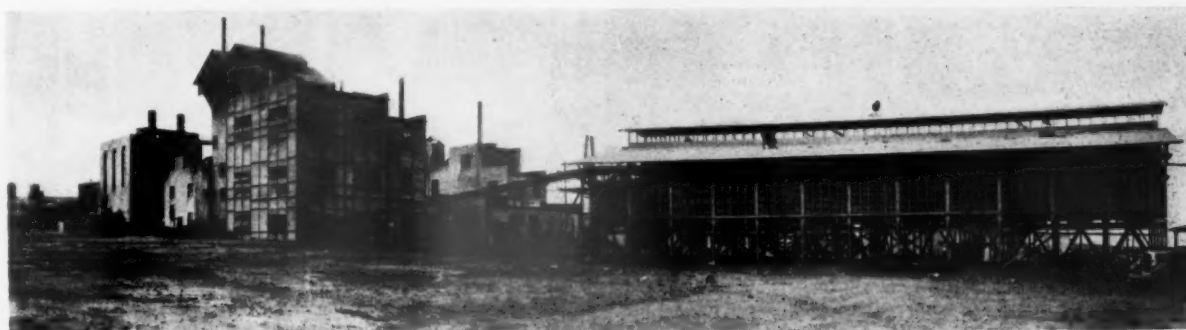
maintained with water seals, the pressure being only sufficient to give motion to the gases.

The char from the carbonizer falls through four hoppers into the air lock compartment which discharges the char on a belt conveyor. The carbonizer has only four moving parts—the four air lock gates discharging char. These gates, a rugged screw conveyor below them and a belt conveyor for char disposal are all operated by a single counter shaft using 7 h.p.

The char disposal conveyor discharges into a hopper at ground level over which

is a shaking bar screen to remove sizes over 1¼-in. It so happens that in these local conditions the sulphur balls from the lignite, which all pass through the carbonizer, are 1¼-in. or larger and are thus eliminated from the char. From the hopper at ground elevation the char

Showing plant from east side with briquette conveyor from press room to storage bins where briquettes become sufficiently hard for handling within a short time in oven over moderate temperature



is raised about 65 ft. in a bucket elevator to the top of the briquetting building. Here the char is pulverized in a Hammer Mill to pass through $\frac{1}{8}$ -in. bar screen and is then dropped into a hopper providing for about 50 tons of char. With present equipment the briquetting press can handle in 5 hours all char produced by the carbonizer in 24 hours.

From this bin the char runs into a mixing drum where pitch is atomized, with superheated steam entering through a jet, into one end of the revolving drum. As mixed, the pitch binder is equivalent to about 8 percent of the weight of the finished briquettes. The melting point of the pitch is 170 degrees Fahrenheit, which is sufficiently high since the adhesion of the pitch to the char is stronger than gravity, preventing the pitch from running out on first firing. The fusion point of the briquette ash is 2,300 degrees Fahrenheit. A coil superheater, heated with flue gases, makes superheated steam for the atomizer.

An elevator takes the mixed char from the horizontal mixing drum to the top of a vertical fluxer in which a kneading process takes place. This is another mixer with arms on a vertical rating shaft which work against stationary arms on the inside shell of the fluxer. The temperature in the fluxer is slightly less than 170 degrees Fahrenheit; it can be maintained at this temperature with superheated steam. From the bottom of the fluxer the mix is taken by a paddle-screw conveyor to the press. The paddles in the screw, being only part sections of the worm, allow a slight cooling of the mix so it is in a plastic condition when it reaches the roll press. The temperature of the mix at the press is about 155 degrees Fahrenheit. From underneath the rolls of the press the warm briquettes drop to the surface of a woven wire conveyor traveling about

125 ft. to the near end of the storage bins and over the center of the bin structure about 120 ft. long. A hand-operated plow discharges the briquettes from either side of the conveyor into bins, of which there are 24, with inclined bottoms; the operator at the same time inspects the quality of the briquettes. The bins, each with a capacity for 7 tons of briquettes, have wooden slat sides and bottoms to allow air circulation for the final cooling and seasoning which is completed within a half hour after the briquettes are binned.

The briquettes are hauled from the bins in $1\frac{1}{2}$ -ton cars, by a gasoline locomotive, on a tramroad $\frac{3}{4}$ mile long, to the tippie at Lehigh Station on the main line of the Northern Pacific Railroad. Here the briquettes are loaded for shipment with a box car loader.

Following are analyses of the raw lignite, char and Lehigh briquettes:

	Moisture	Volatile	Fixed carbon	Ash	Sulphur	B.t.u.
Raw lignite, wet	40.40	26.35	26.45	6.80	0.86	6,380
dry		44.35	44.30	11.45	1.44	10,740
Char, wet	1.15	10.90	73.80	14.15	2.24	12,759
dry		11.00	74.59	14.30	2.26	12,778
Briquettes, wet	1.30	15.95	70.05	12.70	1.98	12,942
dry		16.65	71.00	12.85	2.04	13,112

It is planned to eventually install a railroad siding from the main line of the Northern Pacific to the plant, so briquettes may be loaded in box cars directly from the storage bins.

Seventy-two tons of briquettes are made from 190 tons of raw lignite from which is extracted five tons of tar with a specific gravity of about 1 at 70 degrees Fahrenheit, which is distilled yielding 2.3 tons of pitch and 2.3 tons of creosote oil and other condensates from the fractions between 400 degrees and 700 degrees. The quantity of tar varies slightly with the quality of lignite and operating conditions. Almost half

enough pitch is produced to bind the mixture for 75 tons of briquettes; about 3.7 tons of asphalt from oil refineries are needed in addition to the 2.3 tons of pitch supplied by the process. A small amount of ammoniacal liquor is produced which has thus far been wasted.

Tar for distillation passes through a dehydrator where it is preheated with gas from the still, which gas passes on through a pipe coil in a surface condenser, the condensates going to a catch basin and from there to a storage tank.

The round vertical tar still, walled in with brick, has a capacity of 11 tons for 8 hours' distilling time. Including time for filling and emptying, the still has a capacity for 20 tons in 24 hours, operating at 700 degrees Fahrenheit. It has been heated with hand-fired briquettes, but the fire box is now being equipped with oil burners.

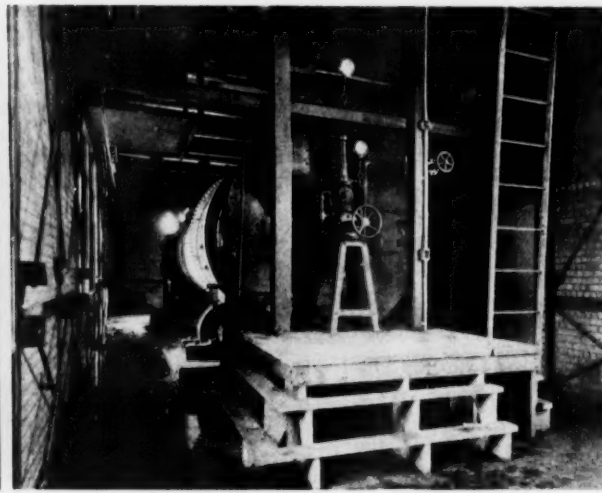
The pitch from the still is run off to

a cooling tank and cooled to 300 degrees Fahrenheit is forced with compressed air to the mixing drum. It can, however, be by-passed to storage tanks or to the melting tank at 250 degrees Fahrenheit and used to help melt the asphalt purchased for the balance of binder requirements.

The power plant consists of 2 Bros boilers for 250 h.p., each with 200 percent overload capacity. When the plant is operating, they burn 35 tons of $\frac{3}{4}$ -in. lignite screenings per 24 hours, equivalent to about 15 lbs. of lignite per kw.h. A 300-kw. steam turbine, operating condensing, generates 220 volts a. c.



The tar washer and centrifugal separator



The mixing drum where pitch is atomized into the char coming from the atomizer

In addition, steam is used for steam heating, mine hoisting, tar heating, heating pitch and tar tanks equipped with steam coils. A spray pond cools water for the condenser. Soft boiler water is taken from a sump entry in the mine.

Water was used at first from the nearby Heart River, but it is extremely hard and condensing and cooling water is now taken from 3 wells about 150 ft. deep for steam condensing and gas washing. Cooling towers with capacity of about 150 gals. per minute, cool water used in the gas scrubber.

The lignite mine has a shaft 60 ft. deep, with single hoist compartment, a counterbalanced self-dumping cage, using a mine car averaging 4,400 lbs. lignite. The seam ranges from 8 to 12 ft. thick with a clay and soil overburden and a fireclay bottom. There are no partings. The grades are extremely flat and uniform. The lignite is undercut with a Sullivan C. E. 7 machine using 220 volts a. c. The track gage is 36-in., haulage is by mules. Ventilation is supplied by a 5-ft. diameter disc fan at the bottom of the air shaft, 100 ft. deep. Cutting is done at night. Including hoist man and foreman, 225 tons per day are mined with 20 loaders, 2 machine men and 10 day men. The mine is free of gas and has an unusually strong top of from 2 to 4 ft. of lignite supporting the roof clay. Entries are driven 8 ft. wide, rooms 20 ft. wide. The workings are laid out on the two entry system with rooms turned off both ways. Except for timber sets around the shaft bottom, no timbering is required and there is no pumping except for a sump entry installed to gather boiler water.

The mining rates last paid were 50

and 60 cents per ton for loading, respectively, in rooms and entries and 8 cents for cutting. On resumption, they expect to pay 45 and 50 cents for loading. The cost, when mining 225 tons per day, was given as follows:

Power	*
Depreciation .....	.10
Labor .....	.80
Material .....	.10
Royalty .....	.10
Taxes and insurance.....	.05

\$1.15

* Charged to briquetting.

The company leases 1,600 acres of mineral rights from the Norwest Improvement Company, owned by the Northern Pacific Railroad, on which the minimum royalty is \$500 per year.

The plant began operation early in 1929, after construction work of almost a year. It ran for 4 months before mechanical troubles were eliminated. In this period the proper mixing of char and binder was redetermined for actual practice, although this had been worked out experimentally. The plant then operated at the rate of 72 tons per day of briquettes, which is the char limit of the present carbonizing capacity.

The operation of the briquetting plant, for an output of 75 tons of briquettes per day, without including the mining of lignite, requires 35 men and about 4,500 kw.h. of power per day. The carbonizer requires 3 men each for three shifts. The power plant requires 4 men per day with 3 men in the briquetting plant.

After an additional carbonizer is added, and the plant is making approximately 300 tons of briquettes a day, two additional men will be needed on each shift for the carbonizers, and not more

than a total of 20 additional men throughout the plant.

When the plant resumes, after reorganization, the required 35 men will mean a reduction of about 25 percent in labor used as against the labor used before the plant was shut down last summer. The monthly payroll will approximate \$5,000. It is stated that the repair and supply costs should not be cut below 30 cents per ton of briquettes if the plant is to be kept in the best of condition, and that after the additional carbonizer is installed, this item may be reduced to at least 25 cents per ton without neglecting the plant maintenance.

The cost of power has run about \$560 per month for all operations, including the power used in the mine and steam used for hoisting lignite. The power costs are not kept separately for the carbonizing and briquetting operation.

It has been estimated that to date the plant has cost approximately \$700,000, and that installing an additional carbonizer, with accompanying equipment (for a total of 300 tons of briquettes per day), will cost about \$200,000 more. The plant depreciation is based on a 25-year life.

Until the time of closing down the plant early last summer, over 22,000 net tons of briquettes had been sold and shipped away from the plant.

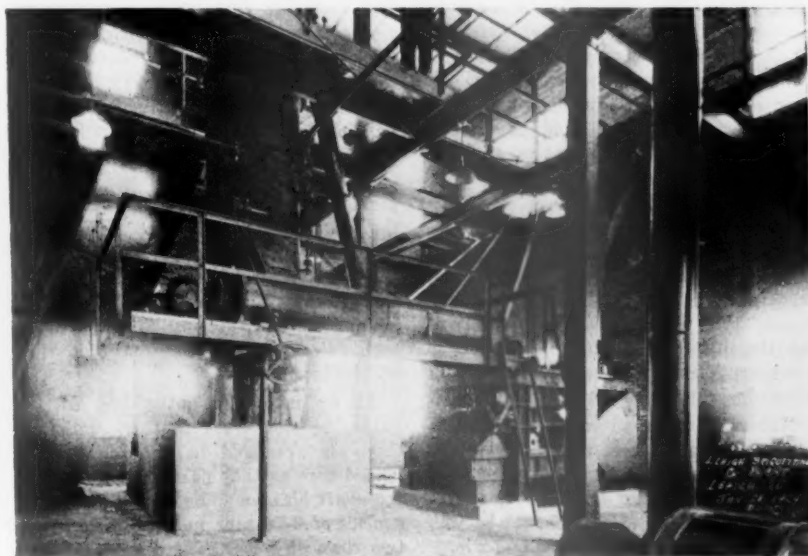
Based on making 300 tons per day of briquettes with 24-hour operation, the total cost per ton of briquettes is expected to be as follows, working 330 days per year:

Lignite charged.....	\$3.00
Wages	1.00
Repairs .....	.25
Asphalt binder.....	1.25
Depreciation .....	.50
Interest on \$200,000 at 6 percent.....	.13
Total.....	\$6.13

If, after the new carbonizer is installed, the plant produces at the rate of 250 tons of briquettes for 24 hours, the cost per ton of briquettes will be approximately \$6.70 per ton.

On this basis, if the briquettes are sold at about \$8 per ton f. o. b. Lehigh, when producing 95,000 to 100,000 tons of briquettes per year, the operation will earn about 10 percent on the authorized stock, after paying all charges except Federal income taxes. In the past the briquettes have never sold for less than \$9 per ton.

With the briquettes selling at approximately \$8 per ton f. o. b. the plant, with a freight rate of \$1.60 to Bismarck and small consumption points within this rate, the briquettes could be delivered to the consumer for \$12 per ton, which would give the retailer a reasonable profit at a price well below the selling price of other (Continued on page 216)



The briquetting press room with fluxer and screw conveyor, conveying gradually cooling mixture to briquetting press

ROCK-DUSTING in a Penna. Coal Mine

By C. W. Owings*

THE Bureau of Mines has repeatedly emphasized the necessity of completely "rock-dusting all coal mines, except anthracite mines, in every part whether in damp or dry condition." Every open accessible part of the mine without exception should be thoroughly rock-dusted, including parallel entries, air courses, trackless entries, crosscuts, and rooms to within at least 40 ft. of every coal face. Very few mines have followed this recommendation and warning, with the result that there have been explosions not only in mines which have not used rock dust but also in so-called rock-dusted mines. Following a number of mine explosions it has been reported that "the mine was rock-dusted," whereas it is probable that only some of the haulage roads had been given a hurried application of rock dust and in most instances not as much as 5 percent of the mine was really rock-dusted. *That is not rock-dusting.*

Some conscientious, well-meaning mining men have felt that rock-dusting of haulage roads would effectively stop an explosion; however, when shown, through widespread explosions in mines "well rock-dusted" according to the above method, that leaving large areas undusted, furnishes paths through which a violent explosion may travel, these men have realized the necessity of thorough rock-dusting and have adopted this explosion-prevention method.

The Mather Collieries mine, Pickands, Mather and Co., operators, at Mather, Pa., was the first mine in Pennsylvania to receive full credit for rock-dusting under the new stringent ruling of the Pennsylvania Compensation Rating Bureau, the provisions of which require that:

Rock dust shall be distributed in all main haulages, in all entries to the last breakthrough, in all rooms to the last breakthrough, and in all intake and return airways. Dust *must* be distributed upon top, bottom, and sides of places. The application *shall* be in sufficient amount and of sufficient frequency to maintain on roof, ribs, bottom, timbers and all places of lodgment, sufficient inert dust so that the combustible content of the resulting mixture of rock dust with mine dust *shall not* exceed 45 percent at all times.

NOTE: Under this requirement all excavations in a mine *must* be rock-dusted to the last crosscut. It is also recommended that a sufficient amount of rock dust be available at all times in every working place so that it can be distributed to the face after each cut is loaded out.

In addition to the rule on rock-dusting, it is also required that on all haulage-ways the road bed must be kept moist

by sprinkling. The Mather Collieries mine not only adheres to the Rating Bureau rules but has adopted more stringent regulations for rock-dusting.

ACKNOWLEDGMENTS

Fulllest cooperation was shown the Bureau's representative during the investigation of these mines, and data were willingly furnished. Special acknowledgment is due F. B. Dunbar, general superintendent; Mr. Bowers, superintendent; Wm. Harrison, mine foreman; A. Sweker, safety engineer, and H. R. Anderson, safety inspector, all of whom contributed toward the successful study of rock-dusting at the Mather Collieries.

SOURCES OF DUST IN MINES

To make rock-dusting more effective by reducing the amount of combustible dust that may settle on it and thereby raise the combustible matter in the rock-dust, it is advisable to take steps to allay the dust at its source. It has been shown by Forbes and Emery, Bureau of Mines Report of Investigations 2793, "Sources of Dust in Coal Mines," that approximately 94 percent of the dust is formed at the working face and less than 6 percent is caused by transportation. Their studies indicated that in the mines where the observations were made, dry under-cutting caused 68.5 percent of the coal dust; drilling with hand augers, 13.8 percent; loading coal by hand, 10.8 percent; pick mining, 1.1 percent; and haulage, 5.8 percent. The effectiveness of applying water to the cutter bar of mining machines is of especial interest; tests indicated that where this method of allaying the dust was practiced, only about one-seventh as much dust was formed as when dry cutting of coal was practiced.

Naturally, when the machine cuttings are wet the amount of dust formed during loading will be decreased; however, to obtain satisfactory dust reduction during loading, the coal pile should be wet down before loading is started and whenever the fresh dry coal is exposed during loading. As additional precaution the tops of loaded cars should be wet before

leaving the working face and again before leaving the gathering parting.

WETTING COAL DUST AT MATHER COLLIERIES

An effective system of keeping the dust in a wet state is in force at Mather Collieries. Water from the pumps is delivered to two sumps, one on the north side and one on the south side of the hoisting shaft, and a centrifugal pump—at each sump—forces water into the pipe lines. An overflow pipe is extended to the bed of an overlying stream on the surface, and the end of the pipe, which is kept about 6 in. below the low water mark, is protected by a screen. In case there is not enough water in the sump to supply the demand, water may be pumped from the creek into the pipe lines. Water pipes are laid to every working place and 25 to 50 ft of hose is supplied for each place.

The coal is cut with top-cutting mining machines fitted with a substantial iron pipe on each side of the cutter arm so that water may be applied to the cutting chain on the ingoing side, regardless of the direction in which the chain is rotating. The machine cuttings are thoroughly drenched and very little dust is formed during the cutting operation—at least very little dust is sent into the surrounding air.

The first duty of the miner after entering his working place and testing the roof and sides for unsafe conditions, is to wet down the coal face and the face region for at least 18 ft. or three "cuts" outby the coal face. During the loading shift, watering is required at such intervals that the coal and dust will be kept moist.

At or near the outby end of the gathering side track in each section, a spray is arranged to wet the tops of loaded cars as they pass on their way to the shaft bottom. The sprays consist of a piece of 2-in. pipe in which are drilled two rows of holes. The perforated pipe is attached to the roof so that the pipe is at an angle of 45 degrees to the axial line of the entry. As the cars pass

* Associate Engineer, U. S. Bureau of Mines.
Reprinted from U. S. Bureau of Mines Report of Investigation 3060.

under, two rows of water jets drench the coal on top of the cars.

In general the haulage roads are kept well cleaned and the road beds are kept moistened by frequently wetting them down. Pipe lines with taps about 300 ft. apart facilitate sprinkling. About 150 ft. of hose is used in sprinkling the haulageways. The combined sprinkling of haulage roads and wetting the coal in the face region has greatly reduced the amount of dust in the Mather Collieries, and is largely responsible for the high noncombustible content of rock-dusted areas in trackless entries that have not been given an application of dust for about a year. In general the workmen state that they like to sprinkle the coal pile as it makes a more pleasant atmosphere in which to work.

ROCK-DUSTING

Rock-dusting is accomplished both by hand application and by machine dusting. A high-pressure dusting machine equipped with several hundred feet of special fire hose is employed to dust trackless entries and crosscuts. It is understood that a relatively low pressure dusting machine with a turntable arrangement has been procured in order to facilitate dusting one pair of entries without having to make a special trip to a "Y" to turn the machine. A permissible storage-battery locomotive is used to propel the rock-dusting train and to supply the machine with power. As the rock-dusting machine is permissible, this outfit may with safety be taken near the face of advancing entries. The chief advantage of the turntable is the ease with which parallel entries may be dusted. Under the present plan of coursing the air, one entry in the pair of butts had to be dusted while the air, passing over the machine, blew the dust onto the motorman.

In each pair of butt entries a supply of sacked rock dust is centrally located and as the working face advances the miner is required to apply rock dust by hand method to the surfaces of the room. The dust must be maintained within at least three "cuts" or about 18 ft. of the face. This rule is well enforced, and during a comprehensive survey of the mine only one room was found in which rock-dusting had not been done; the reason for the failure to dust this room was that it was not accessible at the time the dusting machine was in that section. In only three other rooms was the application more than 20 ft. from the face and the rock-dust had been applied to within 40 or 50 ft. of the face of these rooms.

SAMPLING

At the time dust samples were taken the dust was damp to moist and in some

places it was of the consistency of mud, thereby preventing the collection of many samples. Wherever possible road dust and rib and roof dust samples were collected from all entries in a set at points approximately opposite one another. When this system is followed more definite knowledge of the actual safety condition as to sufficiency of rock-dusting is obtained, not only for the haulage road but also for the trackless entries as well.

The standard method of collecting samples as recommended by the U. S. Bureau of Mines is followed at the Mather Collieries. A strip of dust 6 in. wide is collected on the floor from rib to rib to a depth of 1 in. Whenever considerable sand is found along the rails, it is not included in the sample. In a like manner a 6-in. strip is collected at the same place from the two ribs and the roof. Where the dust can not be readily brushed into the scoop with the soft paint brush, stiff bristle nail brushes are used. It is important that all dust be brushed from the ribs and roof, in every sample, in order to obtain comparable results. The dust, except where too moist, is screened through a 10-mesh sieve in the mine and through a 20-mesh sieve in the laboratory.

Samples collected.—Samples collected during a recent inspection of rock-dusting were fairly representative of average conditions. Several samples were collected on side tracks or at points on haulage roads where trips were gathered. The object was to show some of the worst conditions in the mine; hence the average condition of the dusting probably was better than that shown by the average of all samples. In many of the butt entries the dust was too moist to sample except at the point at which the mule-hauled trips stopped and started; hence many of the butt-entry samples are representative of the worst mine conditions.

Road-dust.—Road-dust samples, collected from 44 points, were analyzed in the coal laboratory at the Pittsburgh Experiment Station of the Bureau, with the exception of 11 that were run with a volumeter in the laboratory at the mine. Volumeter determinations were made on practically all of the other samples as a check on the method.*

The moisture content ranged from 0.7 to 8.1 percent in the road-dust samples collected, although it is probable that in some places too wet to sample, the moisture content was in excess of 20 percent. The average moisture content of the road dusts was 2.2 percent. The percentage of ash ranged from 25.1 on a loaded side track to 86.6 in a trackless entry, and the average ash content was 63.5 percent. The total incombustible content, or the moisture plus ash, ranged from 33.2 percent on a loaded

side track to 88.4 percent on a trackless entry, and the average incombustible content was 65.7 percent.

A discussion of the location and analysis of the road-dust samples as to haulage roads and trackless entries is interesting and instructive. Considering the ash content of the samples, it is noted that the average road-dust sample contains 63.5 percent ash; the trackless entries have an average content of 70.9 percent, the haulage roads have an average of 64.8 percent, and the side tracks have an average of 46.4 percent.

The minimum incombustible content recommended by the U. S. Bureau of Mines and the Pennsylvania Compensation Rating Bureau is 55 percent, and according to these blanket recommendations, the average road-dust content is well above the requirements; but when analyzed according to locations the *worst* conditions average 8.6 percent less ash than that required by the Rating Bureau, and the average of the others is above the requirement.

The average of the samples, the incombustible content of which was determined by volumeter, is 66 percent inert matter. The samples were taken principally in trackless entries, although one sample containing 55 percent incombustible matter was collected on a side track in a butt entry.

Rib Dust.—Rib dust samples, in which generally was included the dust from the roof, were collected from 43 locations, of which number 33 were analyzed in the Pittsburgh coal laboratory of the Bureau and in the remainder the incombustible content was determined by a volumeter at the mine laboratory.

The moisture ranged from 0.2 to 4.4 percent, the average being 1.7 percent or 0.5 percent lower than the average of the road dusts. The ash content of the rib dusts ranged from 50.7 to 95.6 percent, the average being 80.8 percent. The total incombustible content, or ash plus moisture, ranged from 52.5 to 95.8 percent or an average of 82.5 percent.

On the haulage roads the average ash content is 84.3 percent, ranging from 62.4 to 98.6 percent. On the side tracks the incombustible content ranges from 50.7 to 92.8 percent or an average of 77.0 percent. The average for the trackless entries is 78.3 percent inert material. Thus it is seen that the average of rib and roof dust samples is considerably in excess of the 55 percent required by the Rating Bureau.

INCOMBUSTIBLE CONTENT REQUIRED

The Mather Collieries have maintained an exceptionally high standard of rock-dusting. Out of the road-dust samples collected, only 4 contained less than 50 percent, 10 less than 60 percent, and 13

* The detailed chemical analyses and volumeter determinations, too lengthy to include here, may be obtained from the Bureau of Mines.

less than 65 percent incombustible matter. Of the rib dust samples, only one (52.5 percent) contained less than 62 percent incombustible matter. This is a standard that few, if any, mines in the United States have attained.

The U. S. Bureau of Mines makes the general recommendation that enough rock dust be applied to the surface of mine workings to keep the incombustible content of the mine dusts above 55 percent. However, to insure that the dust is rendered inert to explosibility, the combustible content of the coal must be considered. Other factors being equal, of two coals that one containing the highest combustible ratio is the more explosive. The combustible ratio is obtained by dividing the volatile matter of the coal by the sum of the volatile matter and the fixed carbon. That is, a typical sample of Pittsburgh coal may contain 36.6 per cent volatile matter and 55.4 per cent fixed carbon. From these figures, it is seen that $36.6 \div (36.6 + 55.4)$ (92.0) is equal to .398 or the combustible ratio is said to be 39.8. Tests at the bureau's experimental mine have shown that for coal dust with a combustible ratio greater than 25.0, and of a size that all passes through 20 mesh and 20 per cent passes through 200 mesh, a mixture containing 63.0 per cent incombustible matter will prevent propagation of an explosion with no gas present. Under the same conditions, it has been found that if the dust in the Pittsburgh bed at the experimental mine contains 60 per cent incombustible matter, it will prevent propagation of an explosion, with no gas present. The combustible ratio at the Mather mines is slightly less than that at the experimental mine, therefore it is apparent that the Mather Collieries are practically protected from a widespread explosion as long as the present high standard of rock-dusting is maintained.

SPRINKLING ROAD BEDS OF HAULAGEWAYS

The requirement of the insurance carrier that all haulage roads must be kept moist probably is responsible for the substandard condition of some parts of the haulage roads. Some of the minor mine officials apparently believe that if the roadways are sprinkled, rock-dusting frequently is unnecessary, and that the moisture offers ample protection. This belief is more or less general among coal mining men.

Some coal dusts, notably in Utah, when containing the maximum amount of water they can hold when wet, are capable of propagating an explosion, if the dust is thrown into the air, and, in general, coal dust must be of the consistency of mud if the water is to pre-

vent propagation of an explosion. In the Pittsburgh bed, the coal dust must contain from 20 to 30 per cent moisture, according to the fineness of the dust, to prevent flame propagation. The moisture in the road-dust samples in which the ash content was low, ranged from .9 to 8.1 per cent, indicating that at these points the moisture was not great enough to prevent the dust from being raised into a cloud, hence it would have been possible to propagate flame at these four points, although it is probable that the rib dust was high enough in inert matter and was present in a large enough amount to prevent propagation. The hazard in connection with watering of roadways lies in the tendency to allow the rock dust content to become too low, and in the event of an explosion neither the rock dust nor the water would be present in sufficient amounts to prevent propagation of the flame. It must be borne in mind that the sole effect of water is to prevent a cloud of combustible dust from being raised into the air. Therefore, regardless of the watering method the incombustible content of the road dust must be maintained at or above the limiting mixture of rock dust. If the incombustible content of road, rib, and roof dust is kept above the required percentage, watering of the roadbeds on haulageways is beneficial in that it tends to prevent the combustible material often found ground into fine particles on haulage roads, from being raised into the air so that it can settle out on the rock-dusted surfaces and thereby decrease the noncombustible percentage of the rib and roof dust. In other words if the watering of the road beds is done constantly and conscientiously, it has merit, but if it is relaxed or neglected and rock-dusting is neglected also, dangerous conditions may quickly arise.

VOLUMETER DETERMINATIONS

Samples are collected monthly throughout the mines. Road dust is collected separately from the rib and roof dust. The dry incombustible content in the dust samples is determined by the volumetric method; a commercial "volumeter" outfit is used for this purpose. The results of the determinations are sent to the Rating Bureau and copies are also sent to the superintendent and the general superintendent. Rock-dusting data are placed on a special map. The extent of the rock-dusting is shown and the incombustible content is indicated at the point at which the samples were collected. Rock-dust barriers are also indicated on the map.

The average difference in percentage between the results of determination of incombustible matter by chemical analysis and by volumeter* for rib and roof dusts was 5.3 and for road dusts was

7.0; in each case the average volumeter determination is less than the chemical analysis. The variations for rib dusts ranged from minus 9.8 to plus 0.1, except for one low reading of 18.0 less than the chemical analysis; for rib and roof dusts the variation was from minus 12.7 to plus 0.4, except that one determination was 19.5 less than the corresponding chemical analysis. Inasmuch as a standard chart was used, rather than one prepared especially for these mines, it is believed the chart was not suitable for the accurate determination of the incombustible matter of the Mather mine dust.

CALIBRATION OF VOLUMETER CHART

It is advisable to calibrate a volumeter chart, when the volumeter is first obtained, by testing coal of known ash content and using the average volumeter reading with the known average ash content to locate a point on the lower part of the curve. The rock-dusting material, the incombustible content of which should be known, should also be determined on the volumeter; the readings and percentages may then be used to locate a point on the upper part of the curve. A straight line between the upper and lower points will develop a curve that may be used to "take off" percentages from the volumeter readings.

A comparison of results indicates that the volumeter gave relatively accurate determinations, and that although the readings were generally lower than the chemical analyses, yet the difference was on the side of safety.

ROCK-DUST BARRIERS

Rock-dust barriers are installed at various points throughout the mine, as secondary defense to the generalized rock-dusting. Parts of the mine that have been idle for some time and, due to numerous falls, are not readily accessible, are protected by rock-dust barriers erected across all openings into the idle section at or near the end of the rock-dusting. As soon as a section is made accessible it is rock-dusted, before production of coal is started.

The barriers are of the V-trough type, similar to those recommended by the Bureau of Mines for general use except that they do not have a baffle board along the top of the barrier, to prevent all dust being dumped instantaneously if the trough is overturned. Some of the barriers were less than 6 in., the minimum distance recommended by the bureau, from the ribs; coal had sloughed off the rib, and had wedged the barrier in place. Several barriers were rendered ineffective by slabs of roof falling on them.

The barriers, as a supplement to generalized rock-dusting, were effective; however, inas- (Continued on page 206)

PRACTICAL OPERATING MEN'S DEPARTMENT

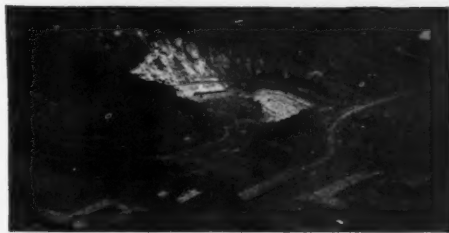


METALS

GUY N. BJORGE

Editor

Practical Operating Problems
of the Metal Mining Industry



Typical miners 100 percent equipped with "hard boiled" hats, goggles, hard toe shoes and gloves

By A. C. Borgeson*

ACCIDENT PREVENTION WORK on the Mesabi Range

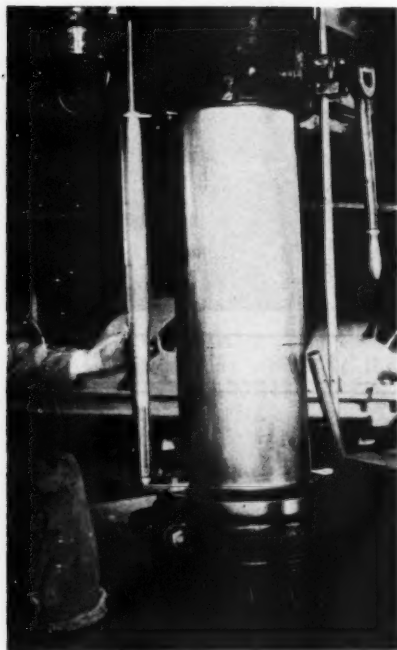
MINING is often credited with being a hazardous occupation due to certain inherent trade risks such as falls of ground, handling explosives, and working by artificial light. These have led to the natural conclusion that mining is more dangerous than most other fields of employment. For this reason, it is perhaps natural that the mining industry should have been one of the first to adopt safety measures looking towards the elimination of accidental injuries to the workmen in the mines.

Mine operators on the iron ranges of Minnesota have long recognized the responsibility of the industry in reducing to a minimum the hazards of mining. As a result accident prevention work in the iron mines of Minnesota has made a progress which compares very favorably with that of any other large mining district in the United States.

HISTORY

Perhaps the first concrete step looking towards the reduction of accidents in the iron mines of Minnesota, was the appointment of county mine inspectors in 1905. It was the duty of these mine inspectors to inspect mines particularly

* Mine inspector, Snyder Mining Company.



Telescope guard for shaft on radial drill made of steel tubing

SAFETY ORGANIZATIONS

A study of the various types of safety organizations employed by the mining operators on the Mesaba Range indicates that there are several royal roads to safety. The two principal types of organization in use might be called the "committee system," and the "inspector system." In addition several companies employ a type of safety organization which is a combination of both systems.

The best example of the committee system is furnished by one of the largest operators with about 30 active mines in the Lake Superior district. This company centers its safety activities in what is called the General Safety Committee, which organization was perfected in 1922. This general safety committee is composed of eight members, usually officials from various districts in the Lake Superior region, and includes representatives from both underground and open pit operations, and from the mechanical department. This committee meets monthly, makes a survey of the causes of accidents, reviews the typewritten minutes of the district safety committees, outlines safety policies where necessary, and passes upon all matters relating to accident prevention.

Under the General Safety Committee, each district has what is known as a District Safety Committee, which also meets monthly and makes regular monthly inspections of all properties, both open pit and underground. It makes a typewritten report to the General Safety Committee, and on a special form of accident report they set forth the causes of accidents for the month, the nature of injuries, and suggest remedies to prevent recurrence. Their suggestions for prevention of accidents are either approved or disapproved by the general superintendent of each district, and passed on to the General Safety

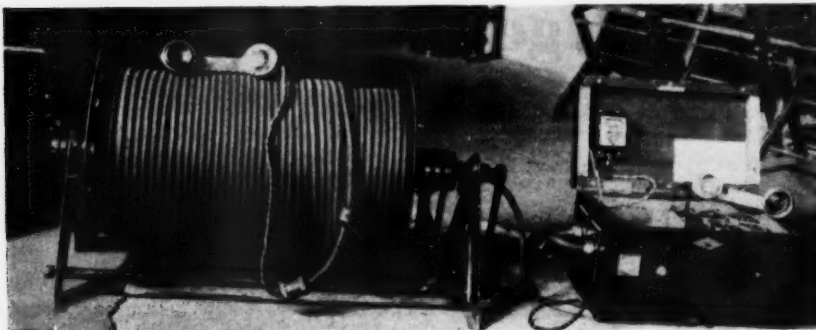
Committee for final consideration and action.

Working in conjunction with the above district committees, there is also at least one, and usually two full time safety engineers in each district.

In contrast with the above committee system, another large operator with about 34 active mines, employs what might be called the local inspector system. This company has no safety committees of any kind, but has what is known as a range safety inspector for each iron range in the Lake Superior region, under whom local or district safety inspectors are in charge of safety work in each district, covering from 2 to 9 mines.

Each district safety inspector makes inspections of all properties at regular and frequent intervals, usually once a week, and submits written recommendations for safe practices, guards or devices to the local superintendent for approval. The recommendations are forwarded to the mine captain or foreman in direct charge of the work, who complies with the recommendations or states his objections on the reverse side of the sheet. These written recommendations are returned to the safety inspector when the suggestions have been carried out. If the recommendations are rejected, they are so marked and returned to the inspector for further consideration. All records are kept by the range safety inspectors and copies sent to the Duluth and Eastern offices.

Another large operator with about 28 active mines employs a safety engineer in charge of all mines in the Lake Superior region, who inspects all properties at regular intervals. His work is supplemented, however, by a local safety committee of three employees at each mine, who are elected by the workmen and serve for one month. This local safety committee makes a complete inspection of the mine at least once a



Mine rescue telephone set, Pickands, Mather & Co., Hibbing, Minn.

as to dangerous conditions, and to report these conditions to the mining companies for correction. Some progress was made in the next few years, but it was not until the year 1911, when a serious and energetic safety movement was started on the part of the mine operators themselves, that an appreciable reduction in the number of accidents began to be noted.

In 1911 most of the larger mining companies appointed their own safety inspectors, drew up and adopted printed safety rules, began guarding machinery, installed mine rescue equipment for fighting mine fires, and started first aid and mine rescue training courses for selected groups of employees. The movement which began about 1911 has gradually expanded and grown until today each large operator has a full time safety department, and most companies have a very extensive safety program. A great deal of thought, energy and money is devoted to the business of accident prevention. Safety has become the first consideration in all mining operations.

month but usually once a week, and makes notes of all dangerous conditions with recommendations. Written copies are filed at the mine office and called to the attention of the foremen of the departments affected, who correct the conditions immediately unless there should be some valid objection.

Once a month a general meeting of all employees is held at the mine usually at the noon hour or at the close of the shift, partly on company time, and partly on the men's own time. Every employee is expected to be present, and quite often a roll call is had. The chairman is usually permanent, and careful minutes of the meeting are kept and sent to the safety engineer, mine superintendent, and the Duluth office. At these meetings the recommendations of the safety inspection committees are discussed, all accidents are reviewed and suggestions made for prevention. A new safety committee to serve for the next month is elected by the workmen. Suggestions made at these meetings are turned over to the proper department, and if practical, are carried out as quickly as possible. In the first 11 months of 1930, this company held 106 such employees' meetings at which 1,102 recommendations were made by employees. The company believes this to be the most important activity in their accident prevention work.

Another company operating 16 or more mines employs a system of safety organization made up of a Central Safety Committee, including a fatal accident investigating committee, a full time safety inspector, foremen's inspection committees, and workmen's inspection committees. They also have a workmen's committee investigating and reporting on all accidents. In addition this company has an annual conference for all foremen, monthly district conferences for foremen, and sectional mine conferences for workmen.

Committee in charge of recent session of Lake Superior Mine Safety Conference. Front row, left to right—F. C. Gregory, Bureau of Mines; A. C. Borgeson, Snyder Mining Co.; Ben Brockbank, Oglebay Norton Co.; G. H. Lohnes, Republic Steel Co.; George Crago, Pickands, Mather & Co. Rear row—G. L. Noyes, Oliver Iron Mining Co.; E. W. R. Butcher, Republic Steel Corp.; R. R. Trengrove, M. A. Hanna Co.; W. H. Carrick, Corrigan, McKinney Steel Co.; L. C. Moore, Cleveland-Cliffs Iron Co.

Two-inch snap hook and safety belt for landers on steel ore cars

Most of the other operators follow one of the above systems, with some slight variations. All of the companies employ a full time safety inspector. Usually there is an annual meeting of all superintendents and foremen, supplemented by local or district meetings to consider special problems as they arise.

SAFETY DEVICES AND MECHANICAL GUARDING

An analysis of the causes of industrial accidents shows that about 10 percent of the accidents are due to physical causes, that is accidents which can be eliminated by effective guarding, or by correcting physical conditions on the job. Guarding of the moving parts of machinery was one of the first matters given consideration on the Mesaba Range, and every operator has spent thousands of dollars to build mechanical guards for all machinery where men can come in direct contact with it. All operators now provide standard guards for all machines.

In addition special attention has been given to such matters as the use of footboards on locomotives, foot blocks in frogs and switches, lock switches for high tension cables to electric shovels, blasting shelter houses, and special safety switches for electric blasting to prevent misfires, or explosions from stray currents. Underground protective devices include such items as electrically lighted contracts, automatic red and green signal lights on tramming systems, the use of shop-cut wedges for miners, wire netting in place of boards for slicing operations, and air lines equipped for the use of stenches to warn miners in case of fire and as water lines for fire fighting. The effective use of guards and safety devices has largely eliminated



that 10 percent of accidents which are due to physical causes.

PROTECTIVE WEARING APPAREL

Falls of ground, often causing head injuries, is the most common form of accidents occurring underground. To avoid these injuries, three of the largest operators have standardized on the so-called "hard-boiled" hat for all men who go below the collar of the shaft. Other companies are following suit. The companies assume part of the cost of the hats, usually selling them to the men at about one-half price.

Several of the companies are recommending to their men the use of the hard toe shoe or boot, designed to prevent injuries to toes and feet. These shoes are usually furnished to the men at cost, which is about the same as for ordinary shoes.

For handling wire tugger-cables underground, many companies are recommending the use of leather gloves or mittens to prevent cuts and infections. Wire screen goggles are also furnished





Bulletin board shelter house, Hanna Ore Mining Company



Outdoor bulletin board, Pickands, Mather & Co.

free to miners by many operators, glass goggles being unsuited for underground work on account of the fogging of the lenses. For surface and shop work standard goggles are compulsory with all companies and are furnished free.

Safety belts are furnished to bank trimmers, for work on large shovel booms and in some cases to landers on steel ore cars at the shafts. Rubber gloves are furnished free to electricians, and to pitmen required to handle the heavy rubber insulated high tension conduits leading to electric shovels in open pits.

The various kinds of protective wearing apparel enumerated above have been instrumental in eliminating to a large extent the type of injury they were designed to prevent.

EDUCATIONAL MEASURES

It has been estimated from analyses of the causes of industrial accidents that 88 percent of the accidents are due to supervisory or mental causes, including such factors as faulty instruction or discipline, ignorance, negligence, or lack of skill on the part of the employe, etc. Only 2 percent of all accidents are considered unpreventable.

In view of the above figures, most employers are coming to realize that education is the big factor in accident prevention. All safety work is more or less educational, but those measures which tend to disseminate information as to the causes and prevention of accidents are usually considered most valuable. On this theory most operators on the Mesaba Range have, at some time or other, gone through what might be called a training period, usually a series of meetings in which all superintendents, mine captains, foremen and others in direct charge of work have become more

or less thoroughly versed in accident prevention measures.

One of the first steps in the accident prevention campaigns of most companies was to draw up elaborate sets of safety rules and regulations, which were printed in book form and covered every operation around the mines. These rule books were usually drawn up in close consultation with the practical men in direct charge of work. The first printed safety regulations were drawn up about 1911 and at that time were generally regarded as rules to be enforced by disciplinary measures. Today, however, they are coming to be looked upon more and more as educational measures or safety standards, and are used as such rather than as a basis for discipline.

Bulletin boards, both indoor and outdoor, are now used by practically all companies. Colored posters and pictures, changed weekly, are used to tell a safety story to the workmen as they come to work.

Some companies issue "Safe Worker" pamphlets or other special printed matter to their men on pay day. Annual safety calendars are also distributed by some operators. Practically all companies are members of the National Safety Council and utilize the various services they have to offer. Several companies have motion picture cameras and entertain groups of employes with safety pictures. One large operator even holds meetings underground in an abandoned pump room at which movies on safety and resuscitation are shown. Another operator holds mass gatherings of all workmen at which time a "safety flag" is raised with pomp and ceremony by an official of the company, at those mines which have no lost-time accidents for a certain period of time. One company has an honor roll system whereby all

mines going one month without a lost-time accident are listed on the honor roll, which is placed on the bulletin boards.

One company, which holds monthly safety meetings of all employes at each mine, is conducting these meetings principally for educational reasons, and feels that these monthly gatherings are the most important feature of their safety program. This same company goes even further and sponsors community safety gatherings quarterly or semi-annually. All employes, their wives and older children are invited to attend these meetings which usually include a short safety talk, a moving picture on safety, and a good two-reel comedy. A matinee performance is given for the children which helps to advertise the evening meeting. A five-piece orchestra is usually provided, and sometimes these meetings conclude with a dance. This company believes these community safety gatherings help carry the campaign of safety education into the home, and it is directly reflected back on the job. During the past year 7,000 people have attended the meetings sponsored by this company.

Safety education has been carried into the public schools in practically all the towns on the Mesaba Range. There is no attempt to add safety as a regular subject on the curriculum, but the idea is to work it in as subject matter in as many ways as possible. For instance in the art department safety posters are made, in the English department safety essays are written, and in mathematics, problems dealing with safety are given. Safety programs and plays are sponsored. Junior safety councils are organized in each school building, and so-called "school police" are used to direct the smaller children safely across the street after school, the "police" being

older children equipped with stop sign and police star, and sometimes uniform. This system has been very successful in eliminating automobile accidents to the children. An accident reporting system has been adopted whereby all accidents whether at home or on the streets is reported by each pupil to his teacher on special cards. These cards are compiled for the entire school system, and then for the county each month, giving valuable information as to the causes of home and public accidents. All of these activities afford valuable safety training for the children, many of whom in a few years will become employees at the mines.

LAKE SUPERIOR MINE SAFETY CONFERENCE

One of the outstanding events of the year in accident prevention circles on the Mesaba Range is the Lake Superior

Standard guarding for band saw, Hanna Ore Mining Company

Mine Safety Conference which is held in Duluth each summer. At this time mine managers, superintendents, mine captains, foremen, safety engineers, shift bosses and other employees gather for a two-day session devoted to mine safety. The first Lake Superior Mine Safety Conference was held June 19, 1919, and was started very largely through the ef-



Mine rescue teams in training, Webb Mine, Snyder Mining Company, Hibbing, Minn.

forts of the district engineer of the U. S. Bureau of Mines.

The conference is usually attended by about 300 men and is financed by the mining companies. Papers are read on various subjects relating to accident prevention, and speakers of prominence are brought in who may have something new to contribute to the cause of safety. There is a large exhibit of safety devices and apparatus by equipment manufac-

turers, as well as models and exhibits by the mining companies. A large banquet is held in the evening with music and entertainment features. At the banquet safety awards are presented to mines with unusually good accident records, and there is usually a safety playlet as part of the program.

This annual gathering is of great value from an educational standpoint, as well as in building up the enthusiasm and interest of the men in the safety movement.

SAFETY PRIZES AND BONUSES

In order to stimulate interest in safety some companies offer various prizes or bonuses to the men at those mines which



establish unusually good safety records. Two large operators offer annual prizes to all men at any mine which can go through 12 months without a lost-time accident. These prizes have consisted of pocket knives, automobile robes, mufflers and turkeys, and every man gets one. One of these companies also distributes cigars with "safety" wrappers to every man at a mine which goes through one months with no lost-time accident.

Another operator offers a good pocket-knife to every man at any mine which goes six months without an accident, and if the mine can go a year without a lost-time accident, the men are presented with gold buttons, which are highly prized. This same company also pays a cash bonus to every foreman for each month in which he has no accidents among his men. Another company pays their shift bosses an extra shift for working a month without accidents to the men under him.

However, all companies do not offer prizes or bonuses for unusual accident records. The policy of one of the larg-

ACCIDENT RECORD ST. LOUIS COUNTY, MINN.

YEAR JULY-JUNE 30	NUMBER EMPLOYED	NUMBER KILLED	FATALITIES PER 1000
1905-1906	12,500	20	1.60
1906-1907	12,500	21	1.68
1907-1908	12,500	22	1.76
1908-1909	12,500	23	1.84
1909-1910	12,500	24	1.92
1910-1911	12,500	25	2.00
1911-1912	12,500	26	2.08
1912-1913	12,500	27	2.16
1913-1914	12,500	28	2.24
1914-1915	12,500	29	2.32
1915-1916	12,500	30	2.40
1916-1917	12,500	31	2.48
1917-1918	12,500	32	2.56
1918-1919	12,500	33	2.64
1919-1920	12,500	34	2.72
1920-1921	12,500	35	2.80
1921-1922	12,500	36	2.88
1922	12,500	37	2.96
1923	12,500	38	3.04
1924	12,500	39	3.12
1925	12,500	40	3.20
1926	12,500	41	3.28
1927	12,500	42	3.36
1928	12,500	43	3.44
1929	12,500	44	3.52
1930	12,500	45	3.60

REMARKS: FROM ST. LOUIS COUNTY-ERS TO GET HOL. GET 1931-1932

est operators is to offer no prizes or bonuses, and it does not enter safety competitions or contests. It apparently feels that the evils which sometimes have a tendency to creep into a competition in accident prevention, outweigh the advantages.

FIRST AID AND MINE RESCUE

During the past year practically all operators adopted the 100 percent first-aid training, that is every man on the job must complete the regular course in first aid as taught by the U. S. Bureau of Mines. In addition to that some companies maintain regular monthly classes for foremen and keymen. First-aid supplies are kept at strategic points underground, in the open pits, and on shovels and locomotives.

The U. S. Bureau of Mines began first-aid and mine rescue training in the Lake Superior district in 1912. Old car No. 8 was the first mine rescue car stationed in this district. Continuous training has been maintained since that time, a total of 15,206 men having been trained in first aid, and 4,338 in mine rescue up to January 1, 1931.

In the matter of mine rescue and training in the use of self-contained oxygen-breathing apparatus, practically all companies have small selected groups of men trained in the use of the apparatus by the U. S. Bureau of Mines. Three of the larger operators maintain sets of approved apparatus, usually one set for each district, and carry on regular training monthly. Many companies are equipped with the "all service" gas masks suitable for use in smoke or gas filled atmospheres, where the oxygen content is not too low to support life.

As already stated some companies have stench equipment attached to the air lines to enable a warning to be sent

to the miners at the breast in case of a mine fire. Usually the air lines are also arranged so that water can be introduced into them for fire fighting purposes. Small hand-operated fire extinguishers are also kept at underground stations and at timber shafts. In some cases fire doors are erected to permit quick closing off of one section of the mine.

Most Mesaba Range mines are shallow and have several shafts or are connected with open pit workings so that natural ventilation is usually very good. In some instances, however, where the air is warm or the relative humidity it is high, large fan installations have been made at the shafts, producing artificial ventilation. These large fans are supplemented with smaller booster fans leading into each contract.

PHYSICAL EXAMINATIONS

Physical examinations of employees is practiced almost universally on the Mesaba Range. Some companies examine all employees once a year, and others examine only the new employees before going to work. One company furnishes an eye specialist when defects are discovered. Examinations are made by company physicians at local hospitals.

The hospitals are under contract and also handle all accident cases and illness among employees. Medical and hospital service for the men and their families is paid for jointly by the company and employees, a small deduction being made from the earnings of the men each month, the company paying the balance. Operations and confinement at the hospital through illness is extra, but at reduced rates to employees.

MAJOR ACCIDENT PREVENTION MEASURES

In addition to standard guarding and the enforcement of long-accepted safety rules, the following may be cited as among the most outstanding examples of safety measures which have been adopted on the Mesaba Range, and which, the operators claim, have contributed to the reduction of accidents in the iron mines.

In open pit work:

- Discontinuance of use of black powder.
- Bank trimming.
- Special care in laying, ballasting and upkeep of tracks.

- Elimination of front and rear footboards on locomotives (not universal).

- Special safety switches and precautions in electric blasting.

- Use of cordeau fuse (by some operators).

- 100 percent first aid training (all employees both open pit and underground).

In underground work:

- Substitution of slicing for square set system of mining.

- Use of wire netting instead of boards for holding cave.

- Use of long (16 ft.) poles on floor of slices to facilitate timbering in slices below.

- Concentration on accidents due to falls of ground.

- Electrically lighted contracts (not universal).

- Use of shop-made wedges in timbering operations.

- Introduction of "hard boiled" hats, hard toe shoes, goggles and leather gloves.

It is difficult to estimate the exact saving in life and limb which has been accomplished through the application of each of these safety measures. One operator claims the use of the "hard boiled" hats has saved three lives in accidents which otherwise would have resulted fatally. The same operator has found that their eye injuries were reduced 80 percent through the use of goggles, and that leather gloves reduced infections of the hands 84 percent. Without question each of the measures listed above has assisted materially in bringing the accident rate down to where it is today.

PROGRESS IN SAFETY

Statistics prove that great progress has been made in the prevention of accidents on the Mesaba Range. The record of fatal accidents for the past 25 years in St. Louis County, Minn., as shown on the accompanying chart, is a good indication of what has been taking place. From a total of 96 men killed in 1905, the total has dropped as low as 9 in 1928, the lowest total yet recorded. There has been a very consistent average drop in the number of fatalities per 1,000 men employed from 1905 to date.

Practically all mining companies have found their accident rate has been steadily and consistently reduced, both as to fatal and serious accidents. One large operator reports their accident rate reduced from 1.38 days lost per 100 shifts worked in 1912 to .46 in 1930. Another reduced their rate from 1.39 days lost per 100 shifts worked in 1919 to .59 in 1930.

Some individual mines have made wonderful records. One mining company now has one open pit mine which has gone 5 years without a disability causing a loss of more than 1 day from the job. Another of their mines has gone 6 years with no disabling accidents, and another has gone 7 years with only one disability case. These three mines have all been presented with the Joseph A. Holmes Safety Association award. Another large operator reports one underground mine employing 120 men which worked 2½ years with only two lost-time accidents, totaling 95 days' disability. This mine has also been awarded

the Joseph A. Holmes Safety Association award.

These figures are an indication that great progress has been made in accident prevention work on the Mesaba Range. Much credit is due to the mine operators who have not hesitated to spend large sums of money to put through their safety programs. The work has been started and carried on largely through the initiative of the mining companies themselves. It has proved to be a profitable investment, both from the standpoint of a saving in compensation payments, and from a humanitarian viewpoint in reducing to a minimum the cripples and suffering, the heartaches and broken homes, which always follow in the wake of industrial accidents.

ROCK DUSTING IN A PENNSYLVANIA MINE

(From page 200)

much as barriers are frequently installed at points not usually traveled by mine officials, it is possible for them to be rendered useless by being knocked down or prevented from turning over if pieces of roof fall on them. Few mining companies, after installing barriers, require regular inspection of them. A designated official should visit each barrier at least once a week, make an examination of it, and then make a written report on the condition of the dust (wet or dry) and of the barrier with respect to its probable freedom of action in case of emergency. Unless such inspection is made, the barriers may not be in condition to operate in case of an explosion; in general, rock-dust barriers are not maintained in anything like safe condition after they have been in place a year or more.

CONCLUSION

Analyses of dust samples indicate that an explosion can not propagate through the Mather mine. Many of the haulage-road samples were collected at points representing the worst conditions. The average condition of the dust is probably better than that indicated by the analyses.

The management of the Mather Collieries has shown a keen appreciation of the hazard of rock-dusting only haulage roads and leaving trackless entries and rooms unprotected. It is only by rock-dusting all open accessible parts of bituminous or lignitic mines that full protection may be obtained by this explosion-prevention method.

In so far as information is available to the U. S. Bureau of Mines, the Mather mine is one of the most thoroughly rock-dusted mines in the United States and is one of the very few mines which can be considered thoroughly rock-dusted.

MINING METHODS and COSTS at the Spring Hill Mine of the Montana Mines Corporation

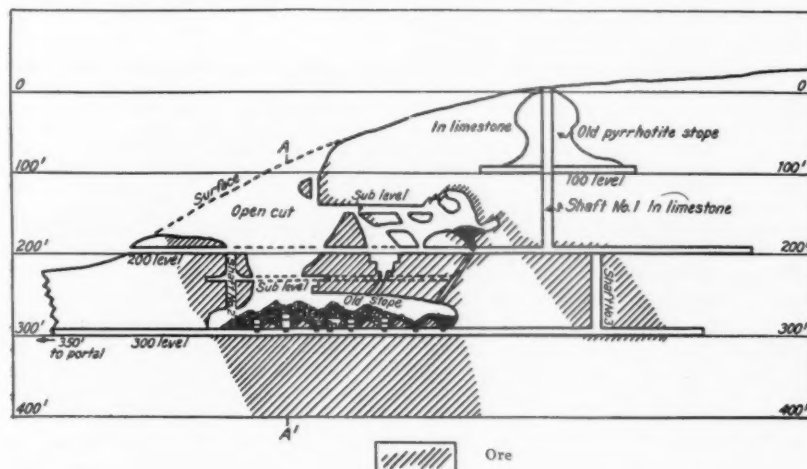


Figure 1. Longitudinal section. Only ore proved by workings and drilling is shown.

By A. L. Pierce*

THIS paper describing the mining practice at the Spring Hill mine of the Montana Mines Corporation, Helena, Mont., is one of a series issued by the Bureau of Mines on mining methods and costs in various districts. Its purpose is to summarize improved methods whereby lower costs have recently been obtained. These improvements are principally the adoption of a modified sub-level stoping method of mining, the use of grizzlies underground, improvements in haulage, and wage bonuses.

The Spring Hill mine is situated in Grizzly Gulch, 3 miles southwest of the city of Helena. Helena is on the lines of the Northern Pacific and the Great Northern Railways; and the East Helena smelter of the American Smelting and Refining Co., to which the con-

centrates from the mine are shipped, is but 6 miles east of Helena. The mine is producing 150 to 200 tons of gold ore per day, with an underground crew of about 40 men.

The geologic description given in this paper is largely taken from a recent paper on the district by F. C. Schrader.† Much of the local history was supplied by A. R. Sherman, the company's assayer. The paper has been approved by Gust Carlson, vice president and manager of the company.

HISTORY

In 1864 gold was discovered in Last Chance Gulch where the business district of Helena now stands. This gulch, Grizzly Gulch, and other gulches nearby, are locally credited with a production of nearly \$40,000,000 in placer gold in the decade that followed. Lode gold was shortly afterward found at the Whitlatch Union mine, three quarters of a mile from the Spring Hill mine. This mine produced \$6,000,000 in gold. The Spring Hill mine was discovered at about the same time, and some of the

claims were patented in 1869. Little mining seems to have been done, however, until about 1900. At that time a company known as the Butte and Pittsburgh Co., started mining pyrrhotite for flux to be used at the Pittsmont smelter in Butte, where pyritic smelting was practiced. This company did a considerable amount of work in the ensuing five years and opened the mine to a maximum depth of 200 ft. by means of an adit connecting with a shaft to the surface. In 1907 other interests purchased the mine, and in that year and the following year there was mined about 22,000 tons of gold ore, which was milled in the Whitlatch mill. This company put down a shaft 100 ft. below the other workings and did some drifting at the lower level. In 1927 the Montana-Idaho Mines Corporation, which was later succeeded by the Montana Mines Corporation, acquired a lease and bond on the property. The first work of the new company was to drive an adit, which is now the main haulage level, to connect with the lowest level of the former workings.

GEOLOGY

The ore body is a large, irregular, contact-metamorphic deposit containing gold as the only valuable mineral. The contact is between the carboniferous Madison limestone and an intrusive body of fine-grained diorite. This diorite is a basic segregation of the quartz monzonite of the Boulder batholith, or the so-called "Butte granite," which is the dominant rock of the region. The lime has been marbled and all evidence of bedding destroyed for over 100 ft. from the contact.

The massive pyrrhotite, for which the mine was originally opened, occurs next to the marbled lime in widths varying from 1 or 2 ft. to more than 30 ft.; It sometimes forms pockets in the lime. Between the pyrrhotite and the diorite is found the main body of ore. This ore, known locally as pyroxenite, consists of pyrrhotite, pyrite, marcasite, and arsenopyrite associated with a fine-grained aggregate of lime-silicate minerals, chiefly tremolite and diopside. Ankerite is found in fairly large quantities in some portions of the deposit.

The average grade of the ore is about \$6 per ton in gold, although the value is not consistent. The gold occurs native and in combination with arsenopyrite and pyrite. Bismuth and antimony are present in small quantities and appear to carry some gold in combination. Min-

* One of the consulting engineers, U. S. Bureau of Mines, and mine superintendent, Spring Hill Mine, Montana Mines Corporation.

Reprinted from U. S. Bureau of Mines Information Circular, 6402.

† Schrader, F. C., *Metalliferous Deposits in the Winston-Deer Lodge Area South of Helena, Montana*. U. S. Geol. Survey, Press Release, August 27, 1929.

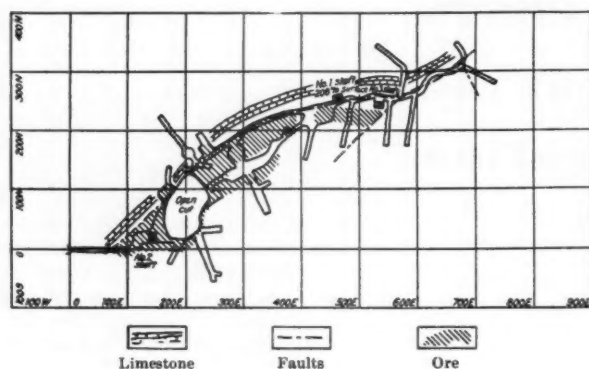
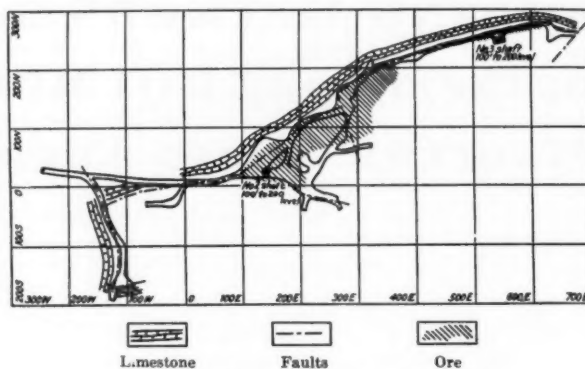


Figure 2. Plan of 200 level.



Note: Slope above level taken for outline of ore.

Figure 3. Plan of 300 level.

erals containing these elements have not yet been found, and their presence is known only by means of assays of the concentrates. The pyrrhotite itself seems to be barren of gold, but it usually has inclusions of gold-bearing arsenopyrite and pyrite.

Physical-Characteristics

The ore is extremely hard and tough. It will stand in almost any form over spans of 60 ft. or more, although it is cracked and seamed in many directions. The dominant cracks are due to jointing. They dip about 35 degrees to the northeast and strike nearly at right angles to the strike of the ore. At intervals of from 6 to 30 ft. vertically there has been movement along the plane of the joints. These slips are characterized by a calcite filling and are responsible for movements of the walls for distances as great as 15 ft. A gouge seam is found at the border of the ore at the limestone, and very often another is found on the diorite side. In addition, a number of seams cut the ore diagonally and have a very high angle of dip. These seams and cracks tend to key themselves so that it is often difficult to bar loose pieces down. In conjunction with the hard and tough ore, these numerous cracks give rise to large rough pieces when the ore is blasted. It is common to find boulders with drill holes through them after blasting.

The ore, like most contact-metamorphic deposits, is quite irregular in outline. In most places the dip is nearly vertical, although locally it may flatten out as low as 60 degrees.

The marbleized limestone wall is very irregular, but it has few seams and stands well. The diorite is jointed even more extensively than the ore, but as it is also quite strong and is required to stand only in nearly vertical faces, it gives no trouble.

EXPLORATION

Prospecting and exploration are carried on by a combination of drifting,

crosscutting, raising, and diamond drilling. Where it is possible to get cross-cut holes to the contact, diamond drilling is used; otherwise drifting is resorted to. Long-hole drills have been used but have not been very successful because in the hard rock the steel loses gauge so rapidly that it is almost impossible to get a hole deeper than about 35 ft. Diamond drilling is done by the company at a cost of \$3 per foot.

SAMPLING AND ESTIMATING RESERVES

In drifting, crosscutting, or raising, a sample is taken of each heading, usually from drill cuttings, in addition to a grab sample from the broken material of each round. All assay records are filed.

Hand samples of faces are not reliable because of the extremely spotty nature of mineralization. Grab samples of the broken ore, which is very coarse, are not to be entirely relied upon. The appearance of the rock has considerable weight in distinguishing between ore and waste. Grab samples are taken from all cars loaded from a given chute in a 24-hour period. These samples are not accurate, but they are indicative of the ore being mined into that chute. The mill heads sample is the most accurate one obtained and forms a basis for checking the appearance and assay value of ore taken from the chutes.

Estimates of tonnage taken from the mine are based on a factor of 1.8 tons per car. These are checked accurately in the mill by weighed samples. Estimates of ore reserves are made by roughly measuring blocks of approximately uniform value and figuring tonnage on a factor of 10 cu. ft. in place per ton of ore. The value of a block is arrived at by observation of the ore and from experience based on chute samples, hand samples, drill cuttings, and mill heads. It is wasted effort to try to measure reserves more accurately as the ore is about three-fourths mined out before the outlines are fully known, and it is entirely mined out before the correct value is known; this is because of the

irregular ore outline and the spotty distribution of the gold.

DEVELOPMENT

The mine is developed from an adit, the lowest of the old workings. This is the only haulage level, and cars are trammed directly from the chutes to the crushing-plant ore bin, 500 ft. outside the portal of the tunnel. All of the ore mined up to this time has come from above this level, and is led into the chutes by gravity. The haulage level follows the contact. Figures 1, 2, and 3 illustrate the plan of development of the mine.

No. 1 shaft, or the old shaft, is used for handling drill steel and supplies to the open-cut and the slope in the west ore body. A newly completed timbered raise on the east ore body gives passage for men and supplies to that section of the mine. This last raise also served to show the width of the east ore body between the 200 and 300 levels.

At present the eastern ore zone is being explored by means of raises, which will be used later as part of a sub-level stopping system if the ore proves to be wide enough. No shaft sinking has been done as yet, although a shaft is planned for the near future.

Development Details

Tunnels, drifts, and crosscuts are 7 by 7 ft. in cross section and are driven on a 0.5 percent grade, with a water ditch below the track on the left side. It is seldom necessary to support drifts, but where timber is required standard drift sets of round timber and pole lagging are used. The rounds are drilled with either upward-cut or downward-cut holes depending upon the jointing, as shown in Figure 4. It has been found that the best results are obtained by having the cut-holes cross the jointing. Drilling is done with a heavy Leyner-type machine mounted on a column and arm. Drilling is done on the night shift in order to balance the air consumption with the air used in the blacksmith shop

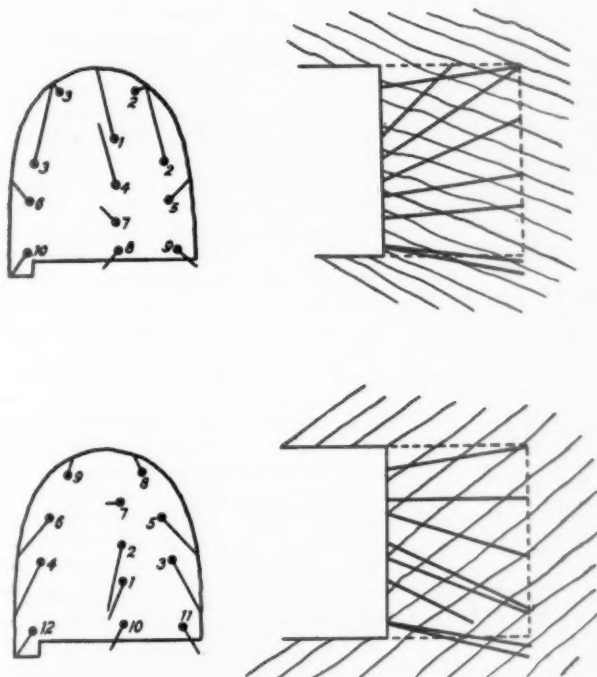


Figure 4. Drift rounds, designed for cut holes to cross jointing. Numbered in order of firing.

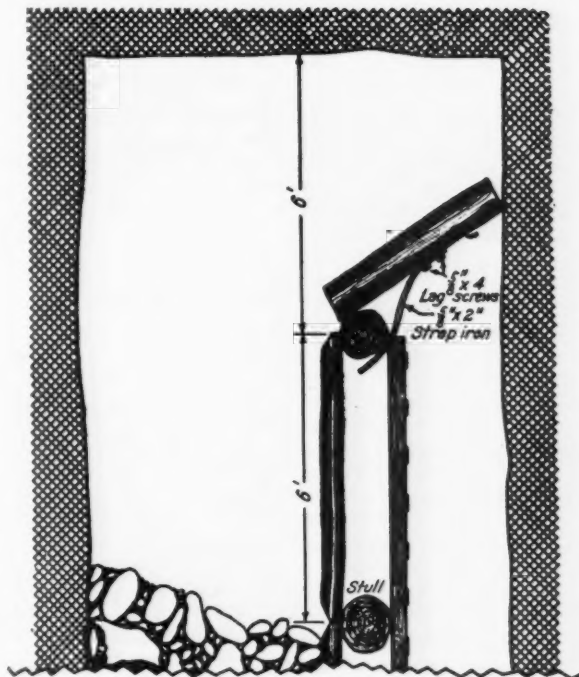


Figure 5. Timbered raise at time of blasting.

on the day shift. A drift crew consists of four men, two men drilling the round on the night shift and two men shoveling on the day shift. Shifts change every two weeks, so that all men share alike under the bonus system in use. The average round pulls $5\frac{1}{2}$ to 6 ft. and requires about one 50-pound box of 40 percent strength gelatin dynamite. Six-foot fuse is used for drift and raise rounds.

Raises that are to be used as ore passes are 6 by 8 ft. in cross section and run on an inclination of about 60 degrees. The only timbers used are sprags from which to drill. Raises that are to be used as manways and four supplies are put up vertically with a cross section of 6 by 9 ft. These raises are studded and lagged to form a manway on one side. The bulkhead used when blasting is shown in Figure 5. In medium ground the round is cut to one side or the other so as to cross the jointing. In exceptionally hard ground, V-cuts in the center are used.

Self-rotating wet stoper drills are employed. Two men with two machines drill and blast a round a shift in inclined raises and a round every other shift in vertical timbered raises.

About one 50-pound box of 40 percent strength gelatin dynamite is sufficient to pull a round of 5 to $5\frac{1}{2}$ ft. Two men are usually given a raise on a footage bonus system.

Drifter drills use $1\frac{1}{4}$ -in. hollow round

drill steel, stoper drills 1-in. hollow quarter octagon steel, and jackhammer drills 1-in. hollow hexagon steel. An 18-in. change in length of steels and $\frac{1}{8}$ -in. change in gage of bits is standard for all drill steel. Starter steels are 2 ft. long. Leyner steel bits start with $2\frac{1}{4}$ -in. gage and all others start with 2-in. gage. Blockholing steel is made up of short broken pieces of jackhammer steel with a bit just large enough to clear the cuttings. A 750-cu. ft. per minute angle-compound air compressor supplies the air for drilling.

MINING

Under the old system of mining, a shrinkage stope was started above the adit level by putting in chutes at 40-ft. intervals with 45-degree connecting raises. The ore between and above these raises was mined out and the opening widened to both walls. Stopping was then started. It soon became apparent that the ore body was much wider than expected, which gave rise to unexpected difficulties. Moreover, the chutes were spaced too far apart for good control of the level of broken ore in the stope. Because of the width of the stope and the physical characteristics of the ore, as previously explained, shrinking was dangerous, as large slabs would become loosened and were difficult to bar down. Blockholing was expensive because the bowlders had to be dug out of the ore. Some bowlders would be buried and missed, causing a tie-up in tramming when they got into the chutes. The in-

vestment in broken ore was also excessive.

It was then decided to try a modified system of sub-level stoping similar to that in use at the mines of the Tennessee Copper Co. at Ducktown, Tenn.† In adapting this system to local conditions it was decided to use as many of the old workings as possible and to make a test of the method. One of the shrinkage chutes was pulled empty, and a grizzly chamber built of timber was put in above the chute. Then by using a small intermediate level, which was about halfway vertically between the back of the stope and the 200 level, and a raise from the stope to the intermediate level, slabbing and benching were started over the grizzly (see Figures 1 and 6). This method worked so well that the broken ore in the rest of the stope was drawn down, ore missed in going up was benched off, and timbered grizzlies were built or are in process of building in each of the old pull holes. The ore between the intermediate and the 200 levels, which formed the bottom of the old open-cut, is being taken out by coming up with stoper drills from the intermediate level. Not all of this ground is drilled and blasted, as it is found possible to weaken it on the diorite side so that a final round of holes will break through and allow it to cave to the limestone on the other side. This change in method has taken some months and is not yet completed. The mill has been supplied almost entirely with the ore de-

† McNaughton, C. H., Mining Methods of the Tennessee Copper Co., Ducktown, Tenn. Bureau of Mines Information Circular 6149, 1929. 17 pp.

rived from this work. The costs of mining given in the tables at the end of this paper cover this period of the transition.

Slabbing is done with Leyner-type machines or with mounted jackhammers with column and arm mounting. Benching is done with heavy jackhammers. The benching is planned to retreat from east to west where possible so as to take advantage of jointing for overbreaking. Bench holes are drilled 6 ft. deep, 4 to 5 ft. apart, and given a burden of about 4 ft. Slabbing holes are drilled three in a row to a depth of 7 ft. and given a burden of about 4 ft. It can be seen that an effort is made to break as much ground as possible with the primary holes. This is because secondary blasting is about the same regardless of how closely the primary holes may be spaced. The miners are furnished with sharp steel, powder, and primers by the nipper. They blast their own holes.

Practically no timber is used in the mine except on the haulage level and for the grizzly chambers.

No standard type of grizzly chamber has been evolved. In each case the chamber has been made to fit the ground as found in the old pull holes and with a minimum of blasting. The grizzly itself is made of 90-pound rails with the web up and spaced 12-in. apart. The rails soon wear so as to give an opening of about 14 in. Timbered grizzly chambers are costly both to install and to maintain, and the new sub-level stopes will have the chambers blasted out of solid rock. An effort is made to blast as many boulders in the stope above the grizzlies as is consistent with safety. Boulders blocking the grizzly pull holes are drilled with hand-rotated stoper drills, and the boulders too large to pass the grizzly bars are either broken with a 14-pound hammer or blockholed with a jackhammer. A stoper and a jackhammer are standard equipment for each grizzly.

Where the ore body is narrow, as in the east end of the 300 level, a shrinkage system is used. This is started by laying plank for shoveling plats and then stoping the back of the drift to a height of about 14 ft. The resulting broken ore is shoveled by hand. Stulls are placed 7 ft. above the track on 6-ft. centers and lagged with pole lagging. Chutes are installed at intervals of 18 ft. The first cut above the timbers is blasted lightly to save the timbers, but as soon as they are protected with ore, the stope is carried up in the usual manner.

UNDERGROUND HAULAGE

The loading chutes are built of 10 by 10-in. posts and 3-in. plank. Chute doors are of 4-in. round fir. This type of chute door lasts a long time, is easily han-

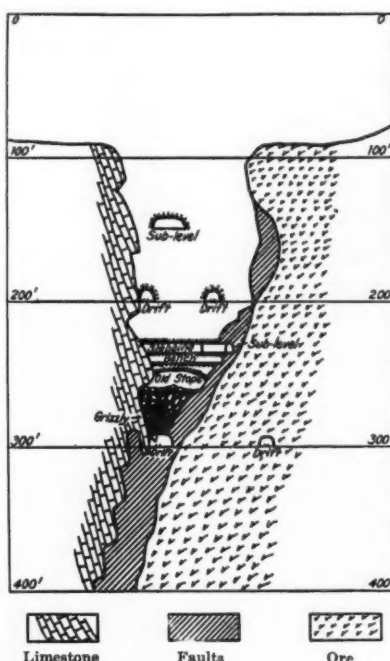


Figure 6. Cross section at A-A', figure 1.

dled, and a spare is quickly put in place if the regular door is lost in pulling the chute. The ore fragments are so large and blocky that no type of mechanical chute door has been considered practicable. The bottoms of the chutes are cribbed and filled with ore, on which the bottom planks are placed. The bottom planks are protected on top with a steel sheet. This construction is found to make a fairly fast-loading chute and one that will stand considerable blasting.

Hand-tramming is almost entirely eliminated. Trammings on the haulage level is still done with the aid of horses, but the length of the haul is relatively short. The ore cars are of a plain-bearing side-dump type which are purchased from a large copper-mining company. It has been necessary to reinforce the cars rigidly in our own shop. They are of 35-cu. ft. capacity, and weigh 1 ton empty and 2.8 tons under the average load. The usual train consists of 6 cars coupled by means of chains and hooks.

The track is of 18-pound rail over most of the haulage level, but all new tracks and replacement tracks are being laid with 24-pound rail; the gage is 18 in. All track on the haulage level has been straightened, long-radius curves substituted for short, and the entire track has been brought to a uniform grade. Throw switches made in the blacksmith shop during spare time have replaced the old type single-point switches. The improvements in the track have eliminated many derailments, and have made it possible to tram more ore than formerly, and at a reduced cost.

ORE EXTRACTION

It is estimated that more than 90 percent of the ore above the haulage level will be extracted by the present method of mining. As the walls are nearly vertical and are self-supporting, pillars are not required and will not be until lower levels are opened. There is practically no dilution of ore by the limestone, as this stands well, is easily detected when drilling, and is therefore seldom blasted. Some dilution by diorite is unavoidable as in places there is a slip on the diorite side that compels the taking of low-grade material. At other points the ore gradually grades into diorite, and stoping limits must be set by assay values. In an irregular ore body this condition means that some low-grade material will be blasted. No attempt at sorting of ore is made because of the difficulty of readily distinguishing between ore and waste. The waste from exploration and development is trammed to the waste dump on the surface.

COMPARISON OF DIFFERENT METHODS

In a wide ore body, sub-level stoping has the following advantages over shrinkage stoping: (1) Sub-level stoping is safer because men are working under a freshly broken and barred back which is readily accessible during the short time it serves for protection; the men are not exposed to the danger of being drawn down with the ore if the trammers below pull the wrong chute or if the ore hangs up and suddenly drops; (2) more ore is recovered, as irregularities are found and followed more easily; (3) the cost of mining is lower because boulders do not have to be dug out of the ore to be blockholed, and none escape the grizzly to slow up the trammings; (4) it eliminates the investment in broken ore, which becomes excessive with a large ore body, and (5) trammings from any given pull hole does not have to stop because men are working above it.

Shrinkage stoping is suitable in narrow ore bodies at this property because: (1) The ore is found at the contact where there is a contact fault which results in several feet of the ore being soft and friable; in widths under 10 ft. the ore breaks much finer than in wide bodies, thus removing many of the objections to this method; (2) men in the district are more familiar with the shrinkage method and are therefore more satisfied and efficient; (3) less preliminary work is required and consequently less expenditure, which tends to offset the investment in broken rock, especially as the tonnage in a narrow ore body is not great.

WAGES, CONTRACTS, AND BONUS SYSTEM

Mining at the present time is done on day's pay, the rates (August, 1930) be-

ing \$5 for muckers, trammers, and grizzly men, and \$5.50 for miners and car loaders. In the shrinkage-stoping period and during the transition to the new system, considerable chute blasting was necessary. Men experienced in the use of powder were therefore employed as car loaders, and paid the same rate as miners. The length of shift is eight hours. Much of the work will be put on a bonus system as soon as the transition in mining system is complete. Development work is paid for at the rate of \$6 per foot for untimbered drifts, raises, and crosscuts, and \$7 per foot for timbered raises. Heretofore the company has furnished all supplies, including powder, but this has not been entirely satisfactory, chiefly because more powder has been used than necessary. Future development work is to be paid for at higher rates, with the men furnishing the powder.

VENTILATION

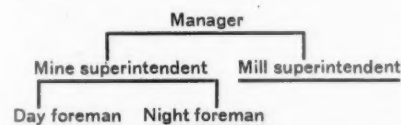
Ventilation is natural, and the air current is very strong. During the winter months it is even necessary to use a door at the haulage portal in order to reduce the draft. The door moves vertically in guides and is counterbalanced so that very little effort is required to move it.

FIRE HAZARDS

With practically no timber in the mine, and a low sulphur content in most of the ore, the fire hazard underground is practically negligible. Most of the outside mine buildings, such as the snowshed and the timbershed, are of sheet-iron construction, and therefore they contribute little to the fire risk. Extinguishers are placed at readily accessible points in the buildings.

ORGANIZATION

The organization for mine operation is very simple, and may be diagrammed as follows:



The manager has complete charge of all work at the property and of the general administration of the company. The mine foreman on the day shift and the mine foreman on the night shift work under the immediate supervision of the mine superintendent. They carry out his mining orders and make contact with the men. Each mine foreman supervises about 17 men. The mine superintendent also supervises the blacksmith shop and the compressor house, and does the engineering as well. His responsibility extends to the ore bin of the crushing plant, and the mill superintendent is in charge of the crushing and the milling.

MINING COSTS

TABLE 1.—UNDERGROUND COSTS PER TONS OF ORE TRAMMED

August 1, 1929, to April 30, 1930. Tons ore trammed: 43,323

	Labor*	Super- vision	Compressed air, drills and steel†	Power	Explo- sives	Timber	Other supplies	Total
Development	\$0.219	.....	\$0.059	.....	\$0.089	.....	\$0.010	\$0.377
Mining .....	.464	.....	.084	.....	.121	.....	.018	.687
Blocking .....	.274	.....	.040	.....	.057	.....	.014	.385
Transportation (under- ground) .....	.110	.....	.....	.....	.....	.....	.021	.131
General underground ex- pense .....	.109	\$0.002	.....	\$0.003	.....	\$0.010	.004	.218
Surface expense (directly applicable to under- ground operation).....	.137	.010	.....	.....	.....	.....	.....	.147
Total	\$1.313	\$0.102	\$0.183	\$0.003	\$0.287	\$0.010	\$0.067	\$1.945

* Underground labor costs include surface labor employed in steel shop and compressor room.

† Includes power for air compression and materials for drill repairs, air, and water lines. Labor used in repairing drills and laying air and water lines is included under "Labor."

‡ Development cost is lower than normal, as development work did not quite keep pace with ore extraction. Due to mining under the old open-cut by methods involving the caving of large amounts of ore, however, reserves of broken ore were increased so that the total mining and development cost is close to normal.

TABLE 2.—SUMMARY OF COSTS PER TON IN UNITS OF LABOR, POWER, AND SUPPLIES

August 1, 1929, to April 30, 1930. Tons ore trammed: 43,323

Method used: Modified sublevel stoping

	Development	Stoping	Total
Labor (man-hours per ton):			
Drilling and blasting.....	0.145	0.675	0.820
Blockholing .....	.....	.406	.406
Shoveling .....	.105	.....	.105
Transportation .....	.....	.....	.163
General .....	.....	.....	.174
Supervision .....	.....	.....	.045
Surface labor applicable to underground.....	.....	.....	.191
Total man-hours per ton.....	0.250	1.081	1.304
Tons per man-shift.....	.....	7.40	4.20
Labor percent of total cost.....	.....	.....	72.70
Power and supplies:			
Explosives (pounds 40 percent strength gelatin dynamite per ton)...	.....	.....	1.262
Mining	0.387	0.626	.....
Blockholing .....	.....	.249	.....
Timber (board feet per ton).....	.....	.....	.385
Total power (kw. h. per ton).....	.....	.....	10.43
Other supplies in percentage of total supplies and power.....	.....	.....	12.6
Supplies and power, percentage of total cost.....	.....	.....	27.3
Percentage of total cost.....	19.4	80.6	100.0

Note—Figures for development are based on total mine production and not on ore from development only.

Drilling and blasting, and blockholing, include labor employed in steel shop.

TABLE 3.—DETAIL OF DEVELOPMENT COSTS IN UNITS OF LABOR, POWER, AND SUPPLIES

August 1, 1929, to April 30, 1930

	Drifting	Raising	Raising
Size of excavation	7 by 7 ft.	6 by 8 ft.	6 by 9 ft.
Timbered or not	No	No	Yes
Physical properties of rock.....	Very hard and tough.	Breaks well when properly drilled	.....
Labor (man-hours per foot):			
Breaking (drilling and blasting).....	3.03	6.83	5.21
Shoveling and hand-tramming	3.03	.....	.....
Timbering .....	.....	.....	3.14
Total labor (man-hours per ft.).....	6.06	6.83	8.35
Feet per 8-hour shift.....	1.32	1.17	.96
Power and supplies (per ft.):			
Explosives (pounds per ft.).....	9.4	10.2	12.0
Timber (board-feet per ft.).....	46	43	19.2
Power (kw.-h. per ft.).....	46	43	44
Labor (percentage of total cost).....	66.9	65.6	63.7
Power and supplies (percentage of total cost).....	33.1	34.4	36.3

Note: Labor for sharpening steel and nipping is included in figure for power and supplies. Labor for advancing air and water lines is included in "Labor."

Tramming drift muck and loading and tramming raise muck are not included in development figures.

NEWS OF THE MINING FIELD

Copper Producers Pledge Aid in Tariff Commission Inquiry

Cooperation of copper mining companies with the Tariff Commission in securing cost data on which to base a report to Congress in response to a Senate resolution was tendered at a conference at the commission participated in by representatives of the industry upon invitation of the commission. The conference covered the scope and plans of the investigation which is to be conducted by the commission to determine the differences in the cost of production of domestic and foreign copper during the past three years as the basis of possible tariff legislation at the next session of Congress. The resolution of inquiry was sponsored by Senators Wheeler (Dem., Mont.), Ashurst (Dem., Ariz.) and Vandenberg (Rep., Mich.). While the commission will inform the Senate concerning the advisability of a tariff on copper, it will not make any recommendation as to the need for or a possible rate of duty.

The conference developed the fact that much of the copper leaving the mines, mills, smelters or other producing plants, both domestic and foreign, has not been bought or sold at open market prices, but has moved by intercompany transfers, and that such transactions are not an adequate measure of cost. The investigation will cover: production, quantity and grade, supported by evidence of purchase, sale and inventory; operating and development expense; depletion or royalty; depreciation; general and administrative expenses; transportation cost; value of fixed assets for the computation of interest on investment. Information concerning production will include data necessary for making cost adjustments on account of joint and by-products. The commission is endeavoring to have its report completed by December.

Metal Rate Inquiry Nears Completion

The investigation of the Interstate Commerce Commission into the nonferrous metal rate structure, initiated more than two years ago, is nearing completion, with only rebuttal evidence and final arguments to be heard. The inquiry was initiated more than two years ago under an act of Congress author-

izing the Commission to readjust the rate structure on all products. The railroads have not taken a pronounced stand for a change in the rates, confining their presentation to conditions under the rate structure as it is at present. There has been some feeling that the Commission might increase the metal rates in order to make up loss of revenue due to reductions in rates on agricultural products.

The Commission recently denied an application of the Federal Metals Corporation to include aluminum in its investigation. The corporation said aluminum is important in the secondary metal trade and that within five years it will be one of the most important of the non-ferrous metals because of its growing trade, many alloys having been developed within the last few years with the use of aluminum as a base with other non-ferrous metals, such as copper. The application to include aluminum in the inquiry, which came near the end of the field hearings on the subject, was opposed by the Anaconda Copper Mining Co. and railroads in the southwest on the ground that it was too late to broaden the investigation by taking in other products.

Work of New Mexico Bureau Reviewed

Reports covering the work of the New Mexico Bureau of Mines and Mineral Resources since its establishment in 1927 have just been published by E. H. Wells, president and director. The Bureau is a department of the New Mexico School of Mines, at Socorro, and hence its activities are supervised by the board of regents of that institution. The work of the bureau consists mainly of (a) the preparation and publication of reports dealing with New Mexico geology and mineral resources, (b) the collection of a library and the compilation of a bibliography of the literature pertaining to New Mexico geology, mines and minerals, and (c) the compilation and publication of data pertaining to the mineral industry of the state.

Circular No. 4—The Hobbs Field and Other Oil and Gas Areas, Lea County—by Dean E. Winchester, has just been issued.

Lead Lost in Smelting Imported Ores Held Dutiable in Reversal of Court Decision

The lead content of imported ores, regardless of recoverability, is dutiable under the tariff law, according to a decision rendered January 28, 1931, by the United States Court of Customs and Patent Appeals in the case of the Consolidated Kansas City Smelting & Refining Company. The original decision of the collector of customs at El Paso in assessing duty of 1½ cents per pound on the lead content of Mexican ores entered by the American Smelting & Refining Company for smelting and refining for the recovery of the copper, gold and silver, had been reversed by the United States Customs Court, Second Division, on the ground that in recovering these metals the lead was lost (see THE MINING CONGRESS JOURNAL, April, 1930, p. 426).

Paragraph 392 of the tariff act provides that "lead-bearing ores and mattes of all kinds" shall be dutiable at "1½ cents per pound on the lead contained therein: *Provided* that such duty shall not be applied to the lead contained in copper mattes unless actually recovered . . ."

The Court of Customs and Patent Appeals holds that the lead content in certain imported ores (the same not being copper mattes) containing copper, gold, silver and lead, is therefore dutiable regardless of its recoverability. "The absence of a provision that lead contained in copper ore, such as that at bar, should not be dutiable unless actually recovered," states the Court, "strongly suggests that Congress intended that such lead should be dutiable, even though it is totally lost in the smelting and refining process."

Mineral Survey of Oregon

The Geological Survey has issued a report of the progress made in the mineral survey of Oregon, begun in 1929 by the State Mining Board and the Survey, and continued in 1930. Some of the results of this work are given and the location of the areas that were mapped in detail is shown. Many additional details of occurrence, composition, and other features of the deposits that bear upon their development and exploitation will be described in the final reports.

Lead Industries Adopt Emergency Measures for Employment Relief

A high level of employment has been maintained in the lead industries through the use of part-time operations and other emergency expedients, according to a statement received by Col. Arthur Woods, chairman of the President's Emergency Committee for Employment, from Clinton H. Crane, president of the Lead Industries Association.

"This result has been attained in the face of a series of adverse factors," says Mr. Crane. "Many firms in the lead industries have gone through the depression with the fixed principle of carrying all their normal number of employees if in any way possible. Canvassing the industry, at the suggestion of the President's Emergency Committee, we find that all the firms reporting are maintaining employment in operations within the United States by reducing daily or weekly hours of labor. Reduction of the number of days per week, rotation of shifts, or rotation of men between departments also are prevalent. Many of our firms are helping spread employment by using regular forces on maintenance, repair, or new construction. In needy cases, direct aid or contributions through local relief agencies are being applied. Office and sales forces are, in general, being kept at or near full strength."

Aluminum Production and Uses Show Increase for 1930

New aluminum produced in the United States during 1930 amounted to 229,035,000 pounds, valued at \$50,961,000, as compared with 225,000,000 pounds, valued at \$51,864,000, produced in 1929, according to a statement of the Bureau of Mines. The principal producing plant was that at Massena, N. Y., where approximately 44 percent of the metal made in the United States was produced. Other works are at Niagara Falls, N. Y.; Alcoa, Tenn.; and Badin, N. C.

The domestic price of new aluminum ingot 99 percent pure was 24.3 cents a pound until June 26, 1930, when a new quotation of 23.3 cents a pound was announced, which price prevailed until the close of the year. A corresponding reduction—from 23.9 cents to 22.9 cents a pound—was made in the price in the outside market for metal 98-99 percent pure.

Certain of the established uses for aluminum showed decreases in 1930 in demand for the metal, but these were more than offset by gains in other uses, particularly in strong aluminum alloy materials, in electrical conductors, and in paint. New uses have been developed and improvements made in older applications largely as a result of industrial research.

Lessened consumption of aluminum in

1930 was especially to be noted in the automobile and aircraft branches of the transportation industry. Other branches of transportation, however, and certain other fields of consumption, showed increases in demand for the metal, notwithstanding the fact that these same outlets suffered a general curtailment of production.

Builders of truck and bus bodies, for example, incorporated aluminum strength members in body frames, in addition to low-stressed parts, such as paneling and roofing. Tank trucks for gasoline haulage and trucks for heavy commodities, such as coal and sand, to light merchandise now utilize aluminum in the form of strong alloy sheets and structural shapes, heat treated to develop maximum physical properties.

In connection with architectural uses, the progress made in aluminum furniture is of interest. During 1930 a total of seven furniture and office equipment manufacturers listed aluminum chairs as standard sales products.

The use of aluminum paint has rapidly expanded, both in the industrial field and in the building field. An important development in 1930 was the completion of tests of aluminum paint as a priming coat on wood, applied to the lumber before shipment from the mill.

The approximate consumption of virgin domestic aluminum by industries is indicated as follows:

	Percent
Transportation (land, air, and water).....	38
Electrical conductor.....	16
Cooking utensil.....	14
Machinery (electrical appliances, etc.)....	9
Iron and steel metallurgy.....	8
Building.....	4
Miscellaneous foundry and metal working..	4
Chemical.....	2
Food products.....	1
General miscellaneous.....	4

Imports of aluminum metal, scrap, and alloy in 1930 were 24,498,544 pounds, a decrease of 49 percent, and imports of hollow ware were 91,504 pounds, a decrease of 26 percent. Imports of plates, sheets, bars, etc., in 1930 were 48,437 pounds, an increase of 120 percent.

Exports of aluminum ingots, scrap, and alloys in 1930 were 607,608 pounds, a decrease of 1 percent, and exports of tubes, moldings, castings, and other shapes were 1,864,308 pounds, a decrease of 24 percent. Exports of plates, sheets, bars, etc., were 16,721,903 pounds in 1930, an increase of 2 percent.

Edgar Zinc Closes Cherryvale Smelter

The Cherryvale, Kans., smelter of the Edgar Zinc Company, subsidiary of the United States Steel Corporation, will be closed for an indefinite period, A. S. McMillan, president, has announced.

Metal from the company's plant is used by the steel corporation, but during the depression the company has accumu-

lated a considerable surplus stock of metal which it has been unable to use. These large stocks, plus an inability to obtain concentrates, has caused the company to close this plant.

The Cherryvale plant was closed last year for several months, but was reopened at the beginning of winter to afford idle employees jobs during the winter.

World Silver Output Declined Last Year

Sharply declining prices tended to reduce production of silver last year, and output in the six most important producing countries fell to 211,428,000 ozs. from 227,880,000 ozs. in 1929 and 222,367,000 ozs. in 1928.

The countries named in the report, prepared by the American Bureau of Metal Statistics, include the United States, with 50,234,000 ozs.; Canada, with 23,447,000 ozs.; Mexico, with 105,204,000 ozs.; Peru, with 16,634,000 ozs.; Australia, with 8,854,000 ozs.; and Burma, with 7,055,000 ozs. These sources supplied approximately 87 percent of the world's production in 1929.

Utah Copper Men Awarded Gold Medals

Thirty-one gold medals, the gifts of D. C. Jackling, president of the Utah Copper Company and the Bingham Garfield Railroad, were awarded to employees who completed a score of years with the companies in 1930 at a recent banquet at the Hotel Utah, Salt Lake City.

Approximately 125 persons attended the affair, including the workers with 20 years service or over, and operating officials.

J. D. Shilling, assistant to the general manager, was chairman of the banquet, and K. G. Lucas, attorney, was toastmaster. Mr. Shilling presented a gold medal to D. D. Moffat, vice president and general manager, who, in turn, awarded the remaining medals.

C. M. Brown, superintendent of the welfare department, was in charge of arrangements.

97 American Mining Companies in Mexico

Ninety-seven American mining and smelting companies, with a total investment of \$230,421,000, are doing business in Mexico, according to a survey of American investments in that country made by Enrique D. Ruiz, Mexican consul general in New York. The report shows that 285 American companies are operating in this republic, and their total investment is \$682,536,000. American investments in Mexico in 1900, the report states, amounted to \$185,000,000.

Tariff Commission Investigating Petroleum Production Costs

The United States Tariff Commission has instituted an investigation under section 332(g) of the tariff act of 1930, for the purpose of ascertaining the differences in the costs of production of crude petroleum, fuel oil, gasoline, and lubricating oils in the United States and in foreign countries which exported to the United States directly or indirectly more than 2,000,000 barrels in the aggregate of these commodities during the period January 1, 1929, to December 31, 1930, inclusive.

This investigation is instituted pursuant to House Resolution 391, adopted on March 3, 1931. The commission completed and submitted to Congress at the recent session a report on the costs of production of crude petroleum. That investigation was limited in its foreign aspects to the Lake Maracaibo district of Venezuela. The new investigation will be broader in the commodity sense, as it includes fuel oil, gasoline, and lubricating oil and will cover a greater geographical area, the House of Representatives having drawn the resolution to include all countries exporting to the United States directly or indirectly more than 2,000,000 barrels aggregate in the last two years.

The results of this investigation will be reported not later than the beginning of the next regular session of Congress.

Bureau of Standards Celebrates 30th Anniversary

Thirty years of service of the public in the realms of scientific research, discovery and advancement, was commemorated by the Bureau of Standards March 7 with the presentation of a portrait of its first director, Dr. Samuel Wesley Stratton.

The bill establishing the National Bureau of Standards was passed by Congress in the closing hours of its session on March 3, 1901, and was signed immediately by President McKinley. From one of the smallest of the Government bureaus housed in temporary quarters and with a staff of about 14, the Bureau of Standards has grown to be one of the most important of the Government's establishments with a staff of over 1,000 and equipment which is said to be the finest in the world for research work.

Upon the establishment of the Bureau, Dr. Stratton was appointed by President McKinley as its first director, and served until December 30, 1922, when he resigned to become the president of Massachusetts Institute of Technology. Upon the resignation of Dr. Stratton, Dr. George K. Burgess, who

has been with the Bureau almost since its establishment, was selected by President Harding on the recommendation of Mr. Hoover while Secretary of Commerce, and has served as its director since that time.

During the first two years of its existence the Bureau was under the Treasury Department, but on July 1, 1903, was transferred to the new Department of Commerce and Labor. On the separation of that Department into the two Departments of Commerce and of Labor, the Bureau was made a part of the former.

Charges of Dumping Soviet Asbestos To Be Heard

Hearing will be held in Washington, May 19, by the Tariff Commission in an investigation of complaints of the Bear Canyon Asbestos Co., of Ambler, Pa., and the Regal Asbestos Mines, Inc., of New York, operating in Arizona, which charge unfair practice in the importation of asbestos from Russia.

Report Reveals Interesting Trends in Size of Bituminous Companies

A special study of the size of the producing units in the bituminous coal industry, by F. G. Tryon, R. W. Metcalf, and H. O. Rogers, of the Bureau of Mines, Coal Division, shows that since 1920 a total of 1,665 operators have gone out of business. By 1929, the number of corporations, partnerships, or individuals engaged in mining soft coal on a commercial scale had fallen from the 1920 peak of 6,277 to the figure of 4,612. The retirements have affected chiefly the small, though not the smallest groups of companies. Tables published by the Bureau indicate that all sizes of companies grew in number from 1895 (the year of the first record) to 1920. Since 1920 the drop has been sharpest in the class producing from 10,000 to 50,000 tons a year. The groups producing from 50,000 to 100,000 and from 100,000 to 200,000 tons a year also show a very sharp reduction, while above 200,000 tons the reduction has been small. The number of companies producing over half a million tons has actually increased. In 1929, there were 218 companies in this class, or 29 more than in 1920.

Measured both by average output per man per day and number of working days per year, the larger commercial companies appear to possess a distinct advantage over the smaller operators.

The relatively small decrease in the number of producers with an output of less than 10,000 tons a year is in part more apparent than real, due to changes in the Bureau's methods of collecting

data which have made its lists of these small operators more complete now than in 1920. The figures, therefore, are not wholly comparable. Furthermore, a good many companies formerly in the 10,000 to 50,000 ton class have since 1920 dropped into the smallest group. There is reason to believe, however, that the mortality in this group of smallest operations has been somewhat less than in the middle-sized groups.

These figures are based on the annual reports furnished by coal operators to the Bureau of Mines.

The wholesale elimination of the smaller producers has tended to concentrate the available business in the hands of the larger companies. Between 1895 and 1905, the tonnage contributed by companies of over 500,000 tons increased from 29.2 percent of the total output to 48.3 percent. During the next 15 years, there was curiously little change, but after 1920, the percentage produced by the large companies rose to 59.8 percent of the total output in 1929. The next size group (companies producing from 200,000 to 500,000 tons) has just about held its own, while the three groups between that level and 10,000 tons have lost from a third to a half of their tonnage since 1920. The smallest class of operators also shows a loss.

Standards Yearbook for 1931 Now Available

The Bureau of Standards announces the publication of the new Standards Yearbook for 1931, the latest volume of a series which was started in 1927. It combines in convenient form in one volume a great deal of original material as well as data which, while published elsewhere, are scattered throughout many periodicals, reports, etc., and are, therefore, not readily available.

The 1931 Yearbook contains nine sections dealing with: Standardization in transport; international standardizing agencies; National standardizing agencies; Federal standardizing agencies, the National Bureau of Standards; municipal, county, and state agencies; general standardizing agencies; activities of commercial, scientific, and technical agencies; and a bibliography of standardization.

A valuable feature of the Yearbook is the complete bibliography on standardization. Ease in finding the desired information is assured by a complete cross index in addition to the usual table of contents. Copies of the Yearbook (Bureau of Standards Miscellaneous Publication No. 119) may be obtained from the Superintendent of Documents, Washington, D. C., at \$1 each.

Mineral Production of the United States in 1930

The estimated total value of mineral products in the United States in 1930 was approximately \$4,795,000,000, as announced by Scott Turner, director of the Bureau of Mines. This is a drop of about 18 percent from the total value of mineral products in 1929.

Declines in values, accounted for both by lower unit prices and by the falling off in output of nearly all mineral products, are principally explained by the depression prevailing during the year in most lines of industrial activity. The total value of metallic products in 1930 decreased about 33 percent, as compared with 1929. Notable decreases in total values, ranging from approximately 25 to 50 percent, were recorded for copper, iron, silver, lead, and zinc, but the value of gold production increased slightly. The total value of nonmetallic mineral products in 1930 decreased about 15 percent from the preceding year. Of the mineral fuels, the total value of natural gas increased, while the total values of bituminous coal, natural gasoline, and petroleum recorded sharp declines.

The following figures give the estimated total value of metallic mineral products and nonmetallic mineral products other than fuels, and of mineral fuels produced in the United States in 1930:

Metallic	\$985,000,000
Nonmetallic (other than fuels).....	1,028,000,000
Mineral fuels.....	2,782,000,000
Total.....	\$4,795,000,000

New Brunswick Station Appointments Announced by Bureau of Mines

The appointment of Dr. Everett P. Partridge, of Ann Arbor, Mich., as supervising engineer of the Non-Metallic Minerals Experiment Station, at New Brunswick, N. J., and of Harold W. Robbins, of Chicago, as editor, is announced by Scott Turner, director of the United States Bureau of Mines.

Dr. Partridge, who is associate editor of Industrial and Engineering Chemistry, succeeds Dr. H. H. Storch, who will take charge of the physical chemistry section at the Pittsburgh, Pa., experiment station of the Bureau of Mines. The chief project now in progress at the Non-Metallic Minerals Experiment Station is a study of methods for producing potash salts from such minerals as polyhalite found in New Mexico and Texas, leucite in Wyoming, and greensand in New Jersey. Considerable fundamental work has been done on this project by Dr. Storch and his associates during the past two years.

Mr. Robbins' duties as editor involve editorial supervision of the publications of the Bureau of Mines, which publishes

annually several hundred reports. He succeeds Frederick W. Horton, transferred to the bureau's mining division for the conduct of research in the mining of non-metallic minerals. Mr. Robbins, for the past 15 years, has been a member of the staff of the department of metallurgy and inspection of the Illinois Steel Company, Chicago.

Canada Puts Ban on Soviet Imports

The Canadian Government, on February 27, placed an embargo on imports of Soviet coal, woodpulp, pulpwood, lumber and timber of all kinds, asbestos and furs. A government statement declared that the decision was based on documentary and other evidence as to conditions in Russia which made it appear that the step was in the best interests of the Canadian people.

"The government is convinced that there is forced labor in the cutting and transport of timber and in the mining of coal, that political prisoners are exploited, that the standard of living is below any level conceived of in Canada and that, broadly speaking, all employment is in control of the Communistic Government, which regulates all conditions of work and seeks to impose its will on the whole world," the statement said.

"This is communism, its creed and its fruits, which we as a country oppose and must refuse to support by interchange of trade."

Russian imports into Canada in 1929 totaled \$909,620 in value, and in 1930 totaled \$1,964,059, chiefly owing to a substantial increase in shipments of coal. Imports of coal from Russia, according to the Dominion Fuel Board, in 1930 were 292,000 tons, or more than double the 1929 imports which totaled 117,000 tons.

Funds Allotted to Bureau of Mines and Geological Survey

Appropriations made by Congress for the U. S. Bureau of Mines for the next fiscal year amount to \$2,278,765. A summary of the allotments is as follows: investigating mine accidents \$433,660; operating mine rescue cars and stations \$359,520; mineral mining investigations \$165,460; mining experiment stations \$231,570; economics of mineral industries \$322,660; testing fuel \$180,610; mining investigations in Alaska \$11,460; oil, gas and oil shale investigations \$232,860; investigation of resources of helium-bearing gases \$74,760; operation of helium plants \$93,010; maintenance of Pittsburgh experiment station \$82,300; salaries and general expenses \$90,895; operation of fuel yards to serve government buildings in the District of

Columbia, through a revolving fund estimated at over a million dollars, from receipts for the purchase of fuel by the departments. From the Navy Department the Bureau will receive \$192,000 for helium for its air service.

The Mint Service will have total appropriations of \$1,721,920. Of this amount \$1,576,360 is for operation of the mints at Philadelphia, Denver, Carson City and New Orleans and assay offices at New York, Boise, Helena, Salt Lake City and Seattle. Nearly \$100,000 will be available for equipping the new assay office in New York.

GEOLOGICAL SURVEY

The Geological Survey will have \$3,332,800 to continue its activities during the year beginning July 1. Some of these funds are immediately available, including the following: investigating mineral resources of Alaska \$84,500; \$25,000 from prior appropriations for enforcing the mineral leasing laws and for supervising mining operations on Indian lands.

The funds available July 1 include: enforcing acts relating to mining on Indian and public lands and on the naval petroleum reserves \$270,000, supplemented by an allotment of \$95,000 from the Indian Bureau for inspecting mines, examining mineral deposits and supervising mining operations on Indian lands; examination and classification of lands to determine their mineral and other character \$199,000; topographic surveys \$780,000; geologic surveys \$400,000; fundamental research in geologic science \$100,000; gaging streams and determining the water supply \$672,000; volcano surveys \$35,000; printing maps and reports \$190,000; salaries and general expenses \$250,000. By allotment from the State Department the Survey will have \$71,060 for operating gaging stations under the water boundary treaty with Mexico.

The General Landoffice is allotted \$700,000 for surveying public lands and inspecting mineral deposits and coal fields. Of this fund \$50,000 is for surveys and resurveys of oil and oil shale lands.

Big Mexican Mine Lays Off 1,600 Men

Due to the continued drop in the price of silver the Santa Maria de la Paz silver mine at Matehuala, State of San Luis Potosi, said to be the third largest in Mexico, has laid off 1,600 men. The mine had been in continuous operation since 1870, its production sometimes reaching as much as 40,000,000 ounces in a year, which is 40 percent of Mexico's greatest annual production.

BRIQUETTES FROM CARBONIZED LIGNITE

(From page 197)

fuels of similar character and equal quality marketed in that district. For both intra and interstate shipment, the freight rate on lignite is on a ton-mile basis.

In addition to being smokeless like briquettes made of low volatile coal, the Lehigh briquettes are reported to hold as good a fire, and the local dealers, of course, favor them because they could, under present conditions, be handled and sold at a lower price. Dealers report that the Lehigh briquettes give practically no degradation in handling.

This Lurgi process is controlled in the United States by the American Lurgi Corporation at 40 Rector Street, New York City.

The Lurgi corporation has lately increased the designed capacity of its carbonizers so that in the largest unit, in 24 hours, should yield enough char to make 200 tons of finished briquettes. The installed cost of the larger carbonizers is represented as being low enough to measurably decrease the investment required per ton of briquettes made in smaller units.

Although creosote oil is sold in limited quantities for wood preserving, it has been omitted from all estimates of prospective income at the Lehigh plant. Mixed with a small amount of hard pitch, it makes a very attractive dark-brown stain suitable for outdoor wood finishes.

Except for tar distillation, a similar plant with 400 tons per day capacity has been installed by the Western Dominion Collieries Company, with main offices in Winnipeg, Manitoba. The plant is said to be operating now, but it buys its asphalt for binder and does not manufacture pitch.

The Wyoming Carbonizing and Briquetting Corporation, with offices in Salt Lake City, is considering the installation of a similar plant at Kemmerer, Wyo. This plant expects to operate on a better grade of sub-bituminous coal than the lignite used at Lehigh, it being lower in moisture than Lehigh lignite. Construction is expected to start as soon as financing is finished.

The rights to the Lurgi Process in North and South Dakota and Montana are controlled by the Lehigh Briquetting Company through a holding corporation in a contract with the American Lurgi Corporation.

The present state of unbalance between the carbonizing and the briquetting and recovery departments of the plant is accounted for by the officials of the company by the fact that one carbonizer was erected at first to prove the mechanical and operating soundness of the principles involved. The ultimate

capacity of the plant originally contemplated the installation of three carbonizers.

S. W. Farnham Dies

Sidney William Farnham, chief mining engineer for the Goodman Manufacturing Company, of Chicago, died on Thursday, March 12, at the age of 59.

Mr. Farnham was well known throughout the mining industry of the United States and various other countries, which he visited on several trips for his company. Thousands of mining men who knew him well will learn with sorrow of his passing. His company loses in his passing a wealth of seasoned experience which can not be measured in ordinary terms.

Mr. Farnham was born September 14, 1872, at Elmira, N. Y. Removal of his parents to St. Louis gave him his early education there, but later he returned east to attend Cornell University, from whose courses in electrical engineering he was graduated with the class of 1894. On the death of his father he succeeded



to the father's position as purchasing agent for the mining interests of the Missouri Pacific Railroad. This position he held from 1895 to 1901, when he entered the service of the Goodman Manufacturing Company shortly after its organization.

He became sales manager and continued in that capacity until, in 1911, he accepted a similar position with the Western Cartridge Company, at Alton, Ill. But he belonged in the mining machinery business, and within two years returned to the Goodman Company, to continue as mining engineer to the date of his death.

He has served his company in all the mining districts of the country, in analysis of physical and operative conditions and in application thereto of best adapted

types and systems of underground methods and equipment. Numerous of the advances and improvements contributed to the industry by his company were suggested or developed by him, and various patents issued to him were assigned to the Goodman corporation.

Much of his time in recent years has been spent abroad, not only in engineering and sales work for his own company, but also on missions for other mining interests. This work took him to Mexico, eastern Canada, England, France, Belgium, Russia, India, and other countries.

Professionally, Mr. Farnham was an active member of numerous organizations affiliated with the mining industry, including American Institute of Mining and Metallurgical Engineers, American Mining Congress, International Railway Fuel Association, Coal Mining Institute of America, Illinois Mining Institute and Rocky Mountain Coal Mining Institute.

New Low Record in Fuel Conservation By Railroads in 1930

A new low record in fuel conservation by locomotives was established by the railroads of this country in 1930, according to the American Railway Association. An average of 121 pounds of fuel was required to haul one thousand tons of freight and equipment, including locomotive and tender, a distance of one mile. This was the lowest average ever attained by the railroads since the compilation of these reports began in 1918, being a reduction of four pounds under the best previous record established in 1929.

A new low record in the conservation of fuel used in passenger service was also established by the railroads in 1930, an average of 14.7 pounds having been required to haul each passenger train car one mile, compared with 14.9 pounds in 1929.

The railroads during the past year spent \$275,213,781 for fuel for both road and yard switching service, compared with \$325,813,895 in 1929, and used 97,857,093 tons of coal for both road and yard switching service. In 1929 the amount was 112,951,929 tons.

The railroads also consumed in road and yard switching service in 1930 a total of 2,320,252,497 gallons of fuel oil compared with 2,568,800,341 gallons in 1929.

A steady improvement has been made by the railroads in conservation of fuel each year since 1920. In part, this has been due to construction of improved locomotives designed to furnish increased tractive power with reduced fuel consumption. It also has been due to improved methods of operation and the elimination of many delays due to the better physical condition of equipment.

U. S. Leads World in Mining of Coal

World production of all grades of coal amounted to 1,410,000,000 metric tons in 1930, a loss of 149,000,000 as compared with 1929 and a decrease of 54,000,000 as compared with 1928. A metric ton is 2,204.6 pounds.

A preliminary report prepared by the Bureau of Mines classifies 197,000,000 tons, or about 14 percent, as lignite and 1,213,000,000 tons bituminous and anthracite. In comparison with 1929, the output of lignite dropped 14.7 percent and the production of bituminous and anthracite was off 8.7 percent.

The United States leads the world in coal production, accounting last year for 482,135,000 tons of all classes. Its nearest competitor was Germany, which produced 288,611,578 tons, including 142,697,760 of coal and 145,913,818 of lignite. Great Britain and Ireland were in third place with an output of 247,662,000 tons of lignite.

Russia produced 39,912,000 tons of all classes during the year, which ends September 30, and Canada, which recently instituted anti-dumping proceedings against the United States, was responsible for 13,490,146 tons of all classes.

Anthracite Institute to Place Seal on Approved Equipment

The use of a seal of approval, to be issued by the Anthracite Institute and placed on hard-coal burning equipment fulfilling the requirements of the institute's laboratory, is announced by C. A. Connell, acting executive director of the institute.

The seal is expected to serve as a mark of identification to the hard-coal consumer-purchaser of equipment, enabling him to buy with assurance devices which have proven satisfactory under carefully conducted investigations and tests at the institute's laboratory. The move is interpreted as a coordinated forward step by producers and equipment manufacturers in providing the most efficient service in the merchandising of anthracite.

Mr. Connell pointed out that equipment manufacturers have been prompt in their response to the initiation of such a seal by the institute. "Our laboratory at Primos, Pa., has received to date 65 pieces of equipment on which investigations have been conducted. Following extensive tests by our engineers, the Anthracite Institute seal of approval has been extended to manufacturers of five stokers, five thermostats, two anthracite-burning service-water heaters, and two vacuum-cleaning devices."

The need of such tests to qualify for the seal of approval is indicated by the fact that to date the seal has been withheld from 22 pieces of apparatus of

various manufacturers, until such time as the deficiencies in the machines are corrected by redesign or through an improvement in the quality of material.

Equipment manufacturers are cooperating with the laboratory staff in their efforts to eliminate defects in equipment before those defects prove troublesome to consumers.

Governor Pinchot Asked for Appropriation for Development of Pennsylvania Mineral Resources

Governor Pinchot was asked on March 10 by a delegation representing the anthracite and bituminous, iron and steel, and slate industries to support a state appropriation for the development of the state mineral industries and the creation of new outlets for their products. The sum of \$204,000 was asked for research work, \$110,000 for educational extension work, and \$117,000 for the equipment of the school of mineral industries at State College.

The speakers who made the plea for the appropriation were C. C. Bonner, Harrisburg, representing the State Federation of Labor; Dr. L. E. Young, Pittsburgh, vice president of the Pittsburgh Coal Company; Hugh J. Harley, Philadelphia and Reading Coal and Iron Company; and C. J. Golden, Hazleton, secretary of the Anthracite Board of Conciliation.

Louis C. Madeira III President of Philadelphia Coal Club

At a recent meeting of the Coal Club of Philadelphia, Louis C. Madeira III, well-known member of Madeira, Hill and Company, was unanimously elected president. Mr. Madeira is a graduate of the Towne Scientific School of the University of Pennsylvania; also a director of the National Coal Association and a member of the American Institute of Mining and Metallurgical Engineers.

Other officers elected were Beverly T. Adams, vice president, Mason-Heflin Coal Company, as vice president, with Charles K. Scull as secretary.

Alvan Markle Dies

Alvan Markle, 70, banker and anthracite operator, died at his home, Conyngham Pass, near Hazleton, Pa., March 19. He had been ill for some time.

Since 1909, Mr. Markle had served almost continuously as chairman of the joint wage committee of miners and operators. He was chairman of the 1925 conference in Philadelphia. He became associated with his father, the late G. B. Markle, in the management of mines and collieries at Jeddo and Highland, and worked through the steps of laborer, miner, foreman, and superintendent. At

Jeddo he established the first modern anthracite breaker.

Later he became vice president and a director of G. B. Markle & Co., and then took over the bank of Pardee, Markle & Green, Hazleton, changing the name to the Markle Bank & Trust Co., becoming its president.

He also was a pioneer in the electric traction field, building the Lehigh Traction Co., at Hazleton, one of the earliest lines, and subsequently built the high-speed line between Hazleton and Wilkes-Barre, one of the first third-rail electric railroads.

Mr. Markle is survived by his widow and five children. The sons are Alvan Markle, Jr., who succeeded his father as president of the Markle Bank & Trust Co.; Donald Markle, president of the Jeddo-Highland Coal Company; Eckley B. Markle, president of the Wilkes-Barre and Hazleton Railway Company, the Lehigh Traction Company, and the Hazleton Auto Bus Company; and John Markle 2d, Allentown, an official of the Bell Telephone Company. A brother, John Markle, retired coal operator, of New York, also survives.

Physical Distribution of Coal Being Studied

The physical movement of coal—that is, from mining district to state of destination—is being studied by the Bureau of Mines. Data for the year 1929 are being analyzed for the benefit of producers and distributors of fuel. It is expected that the information developed will be valuable to industries considering new locations and those studying the available sources of power.

Data are already compiled on the consumption of fuel oil and natural gas by states and the hydroelectric power generated by states. Thus, upon completion of the present study, the figures for coal will be shown in relation to oil, gas, and hydroelectricity in a composite picture of the power and fuel requirements of each state.

Production of Coal in February

The total production of bituminous coal for the country as a whole during the month of February, with 23.9 working days, is estimated at 31,408,000 net tons by the Bureau of Mines; this is in comparison with 38,542,000 tons produced during the 26.3 working days of January. The average daily output in February was 1,314,000 tons, a decrease of 151,000 tons, or 10.3 percent, from the daily output of 1,465,000 tons for the month of January.

The production of Pennsylvania anthracite amounted to 5,391,000 net tons in February, and 6,157,000 tons in January.

Census of Coal Industry Reveals Interesting Facts

The Department of Commerce report on the census of the bituminous industry in 1929, taken in 1930, shows there were 4,831 enterprises engaged in the industry in 1929, a decrease of 27.2 percent since 1919, when the last census was taken. The average number of wage earners for the year amounted to 457,796, a decrease of 16.1 percent; wages paid amounted to \$573,447,575, a decrease of 16 percent; supplies, fuel and purchased electric current cost \$143,746,670, a decrease of 20 percent; the f. o. b. mine value of the coal produced was \$963,045,236, a decrease of 15.8 percent; the average value per ton f. o. b. mine was \$1.80, a decrease of 27.7 percent. The bituminous production in 1929 amounted to 563,041,149 tons, an increase of 16.4 percent over 1919, and the aggregate horsepower of equipment was 3,064,440, an increase of 42.2 percent. The horsepower per wage earner was 6.7 percent, a decrease of 3.2 percent. The ratio of percent of cost of supplies, fuel and purchased electric current to the value of coal produced was 14.9 percent in 1929, as against 15.7 percent in 1919; and the ratio of wages to the value of the coal produced was 59.5 percent in 1929 as against 55.7 percent in 1919.

The production figures cover the output in 29 states in 1929, the largest producers being as follows: Pennsylvania, 144,063,835 tons, or 26.9 percent of the total; West Virginia, 139,141,875 tons, or 26 percent; Illinois, 60,650,613 tons, or 11.3 percent; and Kentucky, 60,217,583 tons, or 11.2 percent. The 1929 data covers operations producing more than 1,000 tons.

In explaining that the number of enterprises as reported is greater than the number of operating companies, the Department states that the number of enterprises represents the number of reports received from the census returns. In some cases a report covered an individual mine only, while in others a report represented a group of mines. A company operating in several counties was required to report for operations in each county separately. In some cases a separate report for each mine operated by a company in a single county was made.

The figures as to wage earners do not include salaried employees. The average number of wage earners as given in the report was calculated by totaling the number of wage earners reported for the several months of the year (in most cases the number on the pay roll on the 15th) and dividing the sum by 12.

The Department states that operators' profits can not be calculated from the figures given as to wages, the cost of supplies and value of the coal at the

mine because no data was collected for certain expense items, such as interest on investment, royalties, depreciation, taxes, insurance, etc.

The power equipment of the mines comprises 1,733,804 horsepower of stationary and 1,330,636 horsepower of mobile equipment. As the 1919 census did not require separate data on the two classes of power equipment, the Department states that it is possible that a part of the indicated increase in aggregate horsepower rating is due to the failure of some companies reporting in 1919 to include data for mobile power.

Largest Mercury-Vapor Turbine Will Be Erected in Schenectady

A 20,000-kilowatt mercury-vapor turbine generator is to be installed in Schenectady in a new power plant, it has been announced by Burton L. Delack, manager of the Schenectady Works of the General Electric Company. The mercury-vapor turbine will be twice as large as the Schenectady-built unit in service at the South Meadow station of the Hartford Electric Light Company; and, because of increased pressure and temperature of operation, it will be even more efficient than the Hartford installation, which itself is so much more efficient than regular steam generating stations.

In addition to the 20,000-kilowatt mercury boiler and turbine, the new outdoor station will include a steam boiler to supply 300,000 pounds of steam per hour, in addition to the by-product output of 330,000 pounds per hour from the mercury condenser, for process, heating and testing steam in the G. E. works.

The mercury required in the boiler will weigh 250,000 pounds—but so heavy is this liquid metal that such a weight occupies a cubical space less than seven feet on a side.

Briefly stated, mercury offers decided advantages over water in turbine operation because it boils at a much higher temperature. The efficiency of any heat engine may be increased by increasing the temperature range through which it works—it is for this reason that steam turbines have been constructed to operate at higher temperatures, and higher steam pressures. The properties of mercury are such that high temperatures can be obtained without high pressure. For example, mercury vapor at a temperature of 958 degrees Fahrenheit has a pressure of 125 pounds gauge while steam at a temperature of only 569 degrees Fahrenheit has a pressure of 1,200 pounds gauge.

Mercury is boiled and vaporized over a fire just as water is boiled and vaporized in a steam boiler. This mercury vapor then drives a mercury turbine, just as

steam drives a steam turbine in an ordinary system. At the exhaust end of this turbine the mercury vapor is still hot enough to boil water and make steam at pressures which are in common use. Therefore, instead of circulating cooling water through the mercury condenser as in the ordinary steam condenser, a level of water is held in the condenser just as in a steam boiler. The water boils and makes steam. A large part of the power generated from the mercury turbine is obtained at very high efficiency since the heat in the exhaust is not lost, but is used in the steam production.

When pulverized fuel is burned, the lower portion of the furnace walls should for the present be protected by water heating surface. The fuel economy will be somewhat impaired with this arrangement of furnace as additional fuel is needed to generate steam directly in the furnace walls. Further experience is needed before the entire furnace walls can be protected with mercury heating surface.

With a load of 20,000 kilowatts on the mercury turbine and with the power developed from the 240,000 pounds of steam generated at 400 pounds pressure and 350 degrees Fahrenheit by condensing the mercury vapor, the expected fuel rate will be 8,800 B.t.u. per net kilowatt-hour. With water cooling in the lower part of the furnace, the fuel rate will be from 9,100 to 9,500 B.t.u. per new kilowatt-hour, depending on the amount of steam generated directly in the water-cooled furnace walls.

The Hartford unit has been in continuous operation since February 4, 1930, except for occasional week-ends and during nine days in May when minor changes were made. The ease in starting and operating the apparatus, and the lack of appreciable vibration and noise of the 10,000-kilowatt mercury turbine is apparent. Low fuel consumption has been obtained consistently over long periods of continuous operation. The ease in operating this apparatus was fully demonstrated in 1930, and experience during the year indicated that maintenance costs will be less than with standard steam plants.

France Proposes Coal Measures

With a view of preventing unemployment in French coal mines, three proposed laws have been submitted to the Chamber of Deputies, according to advices to the Department of Commerce. They propose a reduction of 10 percent per 100 kilometers in transportation rates on French coal; a special tariff on foreign coal carried by railroads and waterways; and to triple the present custom tariff and importation tax on foreign coal entering France.

CINCINNATI - May 11 to 15

WITH practically all available exhibition space reserved, and the program receiving those final touches to insure the utmost value to those attending, the coal industry awaits the week of May 11 with unprecedented interest and prepares to descend upon Cincinnati in record-breaking numbers for the eighth annual convention of Practical Operating Men and National Exposition of Coal Mine Equipment, staged by the American Mining Congress.

Each year the forthcoming meeting at Cincinnati is hailed as an improvement over the last, and each year sees this boast fulfilled. The relentless efforts of the management and the committee of prominent operators in charge of the program are already being justified in the interest being manifest and the deluge of requests for reduced railroad fare certificates. By special arrangement with the carriers, delegates attending the meeting, whether members of the American Mining Congress or not, are allowed to make the round trip to Cincinnati at the rate of one and one-half of the one-way fare.

A synopsis of the convention program was presented in the last issue of *THE MINING CONGRESS JOURNAL*. A development since then, and worthy of mention, is that the session on Fuel Utilization, to be held Friday afternoon, May 15, will be under the auspices of the Committee of Ten—Coal and Heating Equipment Industries, and the National Coal Association. Oliver J. Grimes is in charge of arrangements. In this connection, a feature of the convention will be a stoker exhibit by manufacturers of such equipment. Leaders in the movement for the wider use of stokers in the burning of coal say that this exhibit will be a revelation to the coal industry. The stokers will be shown in actual operation during the convention, and tests will be run daily on different grades and sizes of coal, with motion pictures descriptive of the use of the stoker and its utility in assuring proper combustion

of coal without the heretofore attendant smoke nuisance.

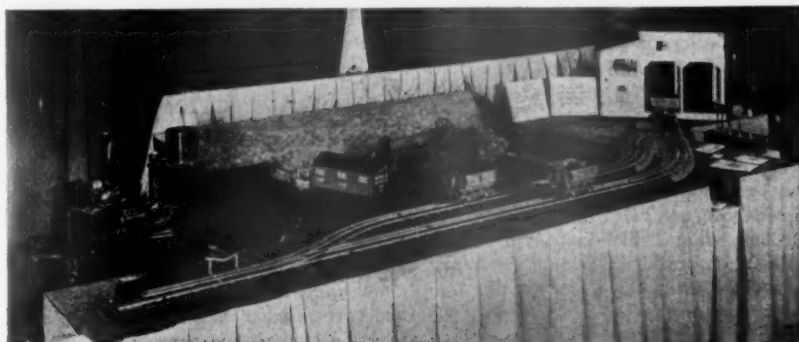
The possibilities in the utilization of stokers are said to be extensive and the convention exhibit of types produced by some of the largest manufacturers will be of particular interest to coal men. Delegations of interested officials and others from Columbus, Louisville, Nashville, and other nearby cities will be invited to witness special demonstrations of the stokers during the convention.

Because of the efforts of the manufacturers each year to present an exhibit that is at least just a little better than they or anyone else has ever attempted, the success of the exposition is assured. Mining men who have seen one in operation, literally, need no urging to attend and take in the next. The management has evolved an excellent system of numbering the booths this year by designating each aisle as a street—100 Street to 600 Street, inclusive, and thereby making it a simple matter to locate any one particular exhibit.

Ralph E. Taggart, of Philadelphia, vice president of the Stonega Coke & Coal Co., chairman of the program committee, was in Washington recently, and expressed himself as gratified with the cooperation of the representatives of the coal industry in developing the program for the convention, which promises to exceed those held in recent years in attendance of delegates from the mining districts, the importance of the exhibits and the attractiveness of the program to the coal operating industry.

The program committee, in addition to Mr. Taggart, includes the following members: Secretary, E. R. Coombes; District Chairmen—George F. Campbell, Illinois-Indiana District; Milton H. Fies, Southern District; E. H. Suender,

A model of a coal stripping operation at the 1930 convention, every piece of equipment actually controlled by the apparatus on the left.



Anthracite District; W. D. Brennan, Far West District; V. C. Robbins, West Central District; Thomas G. Fear, Pennsylvania, Northern West Virginia and Ohio District; P. C. Graney, Southern West Virginia, Eastern Kentucky-Tennessee District. District representatives are as follows: Illinois-Indiana—Paul Weir, J. D. Zook, G. C. McFadden, T. C. Mullins, G. E. Lyman, H. H. Taylor, Jr., F. S. Pfahler, W. J. Jenkins, W. F. Davis, C. J. Sandoe, Chas. Gottschalk, Hugh Shirkie, P. L. Donie, C. J. Fletcher, C. T. Hayden.

Southern District—D. A. Thomas, C. E. Abbott, J. A. Long, C. P. Moore. Anthracite District—T. D. Lewis, R. E. Hobart, A. M. Fine, C. Evans, Jr., A. B. Jessup, Paul Sterling, D. Ingersoll, Jos. Mayers, B. H. Stockett. Far West District—F. A. Sweet, D. A. Stout, F. W. Whiteside, S. Tescher, Gilbert C. Davis, Otto Herres, E. P. Lucas, I. N. Bayless, Edw. Bottomley, Gomer Reese. West Central District—K. A. Spencer, Ira Clemens. Pennsylvania, Northern West Virginia, Ohio District—P. C. Thomas, Dr. L. E. Young, R. M. Shepherd, E. J. Newbaker, Albert L. Hunt, T. R. Johns, A. J. Musser, Newell G. Alford, C. W. Gibbs, D. D. Dodge, W. P. Vance, J. J. Geary, A. R. Pollock, Ezra Van Horn, Wm. P. Cayton, A. B. Kelley, F. B. Dunbar, M. D. Cooper, R. V. Clay, H. L. Warner, E. J. Christy, Wm. Emery, Jr., W. J. Heatherman. Southern West Virginia, Virginia, Eastern Kentucky-Tennessee District—H. B. Husband, H. S. Gay, Jr., H. D. Smith, Chas. W. Conner, J. W. Bischoff, J. D. Rogers, Geo. T. Stevens, Thos. H. Clagett, C. A. Griffith, L. C. Skeen, L. B. Abbott, T. E. Jenkins.

The Internal Revenue Bureau reports that 5,118 mining and quarrying corporations paid income taxes of \$40,849,281 for the calendar year 1929, based on returns filed to August 31, 1930. These corporations had gross income of \$2,645,234,475, net loss for prior year of \$20,070,397 and net income of \$398,223,091. There were 7,149 corporations which had gross income of \$902,165,555 and deficits of \$175,696,116, and 5,532 inactive corporations for whom no income data was reported.

The American Railway Association estimates that car loadings of mineral products during April, May and June will be less than those in the same period of last year. Loadings of ore and concentrates are estimated to decline 20.1 percent; iron and steel 6.7 percent and coal and coke 2.6 percent. For petroleum and products a gain of 1.9 percent is expected while an increase of 1.7 percent is predicted for chemicals and explosives.

WITH THE MANUFACTURERS

Mine Trolley Clamp Accommodates Wire of Heavy Section

Operators of mine and industrial haulageways are turning more and more to the use of 6-O trolley wire for handling heavier locomotives and larger loads. To accommodate wire of such larger section, the Ohio Brass Company has designed its new Bulldog trolley clamp with larger and heavier parts, at the same time retaining the features which have made this clamp so popular.



Greater opening of the jaws to accommodate the larger wire has been provided, and still more gripping power and strength have been built into the clamp. Jaws are heavier, and the gripping nut and hinge are more substantial. Conditions may be met where it is desirable to allow the clamp to release the trolley wire under excessive stress. Accordingly, the gripping power of the new clamp may be adjusted.

Like former models of this device, the jaws open and close by positive action brought about through the vertical motion of the head nut. The length of the jaws of the new clamp is 3 in.

Heavy Electrode Permits Quality Welding

The General Electric Company announces a new heavily coated electrode, designated Type R, for quality welding. This particular type of electrode is composed of .13 to .18 carbon steel covered with a heavy coating of cotton braid impregnated with an arc stabilizing flux, and will be available in diameters from $\frac{1}{8}$ to $\frac{3}{8}$ in. by 18 in. length.

Metal deposits of this electrode will have high tensile strength and will produce a homogeneous structure resulting in a ductile weld. This is caused by the fact that, during the arc transference period, the metal is in a protective atmosphere because the electrode itself burns away quicker than the coating and excludes those elements always preva-

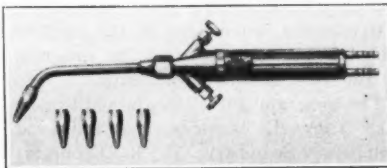
lent in atmosphere which cause some undesirable results when the use of an uncoated rod is used.

Extreme arc stability and high arc voltages permissible from this type of electrode produce an unusual high speed of welding for certain applications.

The new electrode is expected to be of particular value in the field of pipeline welding where speed and ductility are essential requirements.

New Aircraft Welding Blowpipe

The Type W-107 welding blowpipe has been added to the Prest-O-Weld line by the Linde Air Products Company as an improved sheet-metal blowpipe to be handled through Prest-O-Weld distributors. While this new blowpipe has been designed primarily for airplane fuselage welding, it is suitable for light welding work of all kinds. In design and appearance it is somewhat similar to the Oxweld type W-15 blowpipe, but it operates on the medium pressure principle. The gases mix immediately in front of the handle and the oxygen



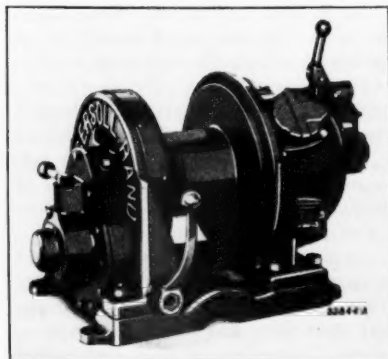
and acetylene valves are so located that they can be readily adjusted with the thumb and forefinger of the hand which holds the blowpipe. The blowpipe is 10 $\frac{1}{2}$ in. in length, weighs only 10 oz., and is perfectly balanced. Six different size tips are available for use with this blowpipe, although it is furnished as standard with five tips, Nos. 2 to 6, inclusive. The blowpipe possesses many advantages in operation, as it is small and light, so that it can be readily handled where fine and accurate work is required.

The complete outfit includes not only the blowpipe but a Prest-O-Weld type R-106 oxygen regulator, type R-107 acetylene regulator, two 25-ft. lengths of 3/16-in. hose, one pair of fibre spectacles, four hose clamps, and instruction book. Further information regarding the blowpipe or the complete outfit may be obtained from any of the district offices of the Linde Air Products Company.

New Size "Utility" Air Hoist

A larger and more powerful air hoist, known as the HU, has been added to the line of hoists manufactured by the Ingersoll-Rand Company. This new hoist has a rated capacity of 2,000 pounds at a rope speed of 120 ft. per minute, but it will safely handle loads greater than this. The cable capacity is 550 ft. of $\frac{3}{8}$ -in. cable.

The hoist is suitable for use wherever



a portable hoist of this capacity can be employed. It is used for skidding and hoisting timbers, handling tools and other material, hauling and spotting cars, single cable slushing work, etc. The base is a heavy, cast-steel plate, provided with holes for bolting to any flat surface, and also is grooved to fit columns to which it can be clamped.

A reversible four-cylinder, radial piston-type air motor is used that is accurately counterbalanced. Ample lubrication is provided for all working parts, and ball or roller bearings are used throughout.

A clutch of the jaw type is provided for engaging or disengaging the motor with the drum. The brake is of the external contracting type.

The weight without cable is 490 pounds, length 32 in., width 22 in., and height 23 in.

The Jeffrey Manufacturing Company recently opened a direct factory branch office located at 602 Esperson Building, Houston, Tex. Thomas P. Burke has been appointed district manager in charge of the sale of all Jeffrey products, including conveying, elevating, crushing, and transmission machinery, chains, and portable loaders and conveyors.

Handbook of Scraper Mucking

The "Handbook of Scraper Mucking" has just been completed and published by the Sullivan Machinery Company, Chicago, after more than two years of work on the part of the company's engineering and research staffs. This work has included field study, voluminous correspondence, reports from engineers in the field, analysis and compilation of many data, and finally tabulation, writing, and editing of the material in 16 different chapters.

While the book deals primarily and principally with metal mining practice, much of the material applies also to tunnel-driving problems, and hence is of interest to public works contractors. There is some material concerning coal-mining

work, although many phases of the use of scraper loading underground in coal mines will of necessity form a subject for separate investigation.

This is the first contribution of general scope to the literature on this subject since the publication of Charles E. Van Barneveld's book, "Mechanical Underground Loading in Metal Mines," in 1924. The book is listed at \$2.

Mine Motors for Pit Car Loaders

Explosion tested motors to equip 200 pit-car loaders are being shipped by the Westinghouse Electric and Manufacturing Company to the Brown Fayro Company, Johnstown, Pa.

These 2-hp. motors are so constructed

that they can be operated safely and without danger of explosion in gaseous areas of mines. The car loaders, which are of the "permissible" classification, are being built by Brown Fayro, and the completed equipments will be delivered for use in mining properties.

Morse Chain Appointments

F. C. Thompson, vice president and general manager of the Morse Chain Company, Ithaca, N. Y., announces the appointment of Walter W. Bertram as sales manager of the Industrial Chain Division. Mr. Bertram, who has been with the Morse Chain Company for 18 years, has been manager of the New York office for the past eight years.

In announcing Mr. Bertram's appointment, Mr. Thompson also announces the appointment of A. B. Wray, former sales manager, to the position of chief engineer in charge of all industrial chain engineering.

Technical Description of Trayco Conveyanscreen

The Traylor Vibrator Company, of Denver, Colo., announced some time ago the development of the "Trayco Conveyanscreen." The screen brings a number of new and interesting practices to the art of screening. The power unit, designated as the vibrator unit, is mounted above the screen sash and imparts its vibration at an angle to the screening plane. This rapid oscillation produces a sharp screening action as well as a conveying motion. Thus the screen can be operated practically flat and, therefore, does away with the necessity of setting the screen at an angle where gravity will cause the flow of the material across its surface. The manufacturer states the Conveyanscreen produces more accurate sizing because the angle of vibration causes the material to keep in closer contact with the screen cloth. The power units which vibrate the sash are the same type and design as those used in Traylor vibrating conveyors. The vibrator is suspended so that all the vibration is absorbed within the unit and none is transmitted to building sup-

ports. The power unit takes its energy from any standard alternating current and through the use of a small motor generator set, furnished with the screen, the intensity of the vibration is under rheostat control and can be varied to meet individual requirements. The screen is furnished in four standard widths and in any length necessary to accomplish the duty. On single and double deck screens, up to 6 ft. in length, one vibrator is used. On screens over 6 ft. long and up to 12 ft. in length two vibrators are used. On screens over 12 ft. in length, three or more vibrators are used to oscillate the screen sash. The steel sash of the screen, over which the screen cloth is tightly stretched, is vibrated as a unit. All cross ribs, for the support of the screen cloth, are equipped with specially moulded rubber strips which protect and prolong the life of the screen cloth. A complete renewal of cloth can be made without special tools in 10 minutes. The manufacturer's bulletin giving further details of the Conveyanscreen is designated as "No. S-102."

Stockland Equipment Sales Becomes Link-Belt Agent

L. P. Spillan, sales manager of the Shovel and Crane Division of Link-Belt Company, Chicago, announces the Stockland Equipment Sales Company, Minneapolis, Minn., as their shovel-crane-dragline agent in Minnesota (excepting a few counties around Duluth) and part of central west Wisconsin. J. W. Chapman, general manager of Stockland Equipment Sales Company, has for many years been active in that territory. Sales representatives of his organization have permanent offices at Thief River Falls, Marshall, Brainerd, and St. Paul, Minn., and at Barron, Mauston, and Eau Claire, Wis.

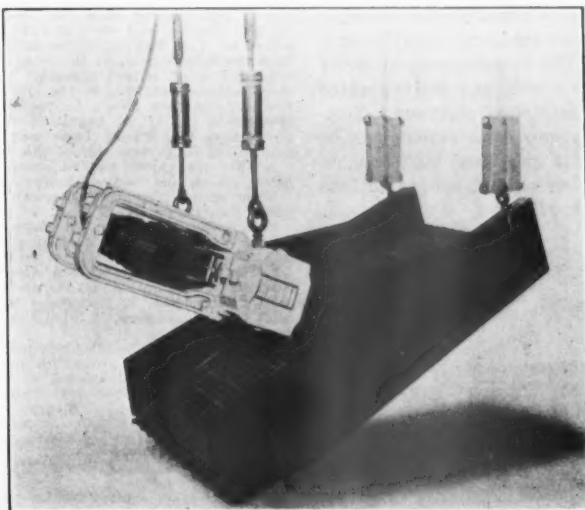
C-E Stoker Unit

Combustion Engineering Corporation, New York, has recently placed on the market the C-E Stoker Unit, a self-contained underfeed stoker with electric drive and integral fan construction.

This stoker has been developed to provide a simple automatic machine for the firing of small boilers up to 150 hp. It has a number of distinctive features, such as agitated grate bars, side dumping grates, and agitated feed hopper which eliminates arching of the coal and interrupted feed.

Three sizes are available with coal-burning capacities of 300, 600, and 1,000 pounds of coal per hour, respectively. Due to its unit construction, it may be installed and placed in operation in 6 to 12 hours.

A folder including photographs and application drawing, a table of dimensions and capacities for the three sizes, and a discussion of the features of the stoker is available upon request.



Explosion-Tested Mining Locomotive Control Apparatus

The explosion-tested mining locomotive has been developed for use in mines, where, on account of the possible presence of explosive gases, modern safety requirements necessitate the use of inclosed electrical equipment. The electrical apparatus is inclosed in substantial cases or boxes so designed and constructed as to confine any spark or arc and prevent their coming in contact with the outside surrounding atmosphere. All inclosures with their apparatus are required to pass the rigorous tests to which they are subjected by the United States Bureau of Mines.

Electrical parts in explosion-tested boxes, because of this fact, require more attention than similar equipment in open type locomotives, so that in order to simplify inspection and maintenance, Westinghouse inclosures for motors, controller, contactors and resistance are provided with tongue and groove covers. These covers are made of cast aluminum and consequently are easily handled. They are securely held in place by means of a pin inserted in a piano hinge on either side of the box. To inspect the equipment in any inclosure, it is only necessary to remove one pin and swing the cover open, or to remove the cover entirely, both pins are withdrawn. Westinghouse has departed from the customary practice and has made their low height explosion-tested locomotive unique in that all main motor control apparatus, except the resistor, is inclosed in what is in effect a single compartment. This design has many advantages, chief of which is compactness and localization of apparatus; reduction in the number of boxes; conservation of space or, in other words, reducing locomotive dimensions; connections from controller to contactors are short and are all inside the compartment, and thus are protected from

mechanical injury; numerous packing glands are eliminated.

Opening one cover of the compartment exposes all parts of the contactors, while, when the cover at the other end is opened, all parts of the controller and overload relay are revealed. Ample space is provided for easy access to controller drums for making repairs, and any drum assembly can be easily removed through the top of the compartment without disturbing fingers and wiring or interlocking assembly. Controller handles are all provided with protective skirts so that water and dirt can not enter the controller compartment.

Morse Chain Holds Sales Meet

The Morse Chain Company, Ithaca, N. Y., recently completed the most enthusiastic sales convention in the history of the company, according to Mr. F. C. Thompson, vice president and general manager. Salesmen from the entire country were called in to spend three days at the main plant at Ithaca, leaving there by special car for a one-day session at Detroit, where the new Marine specialties recently developed were presented to them.

Officials of the Borg-Warner Corporation, of which the Morse Chain Company is a subsidiary, were in attendance at a banquet which marked the close of the convention.

Portable Testing Kits

A new portable testing kit for alternating current, for checking current and voltage in industrial plants and for central station use, has been announced by the General Electric Company. The kit overcomes one of the most serious drawbacks to the testing of motors, transformers and like apparatus, since there is no need to disconnect leads or open the circuit under test.

The testing kit includes a new split-core current transformer, a companion ammeter, another portable instrument, a 10-ft. two-circuit lead, and a leather carrying case. The transformer, ammeter and lead form a unit, and are calibrated together for maximum accuracy. Testing kits of various combinations can be made up to suit individual requirements and a 50-ft., two-circuit, calibrated lead can also be supplied.

Opening with a flick of the thumb, the new transformer snaps tightly closed, encircling the line wire. The ammeter, of the AS-3 type, is sturdy, compact and accurate. Other instruments of the same type, single- and double-rated ammeters and single-, double- and triple-rated voltmeters, are available. The carrying cases, of heavy black Scotch-grain leather and built to stand rough usage, are of three sizes to fit different combinations of instruments.

One method of using the kit is to have one turn of the line through the transformer. The ammeter then indicates directly on the scale the actual current in the line. When it is desired to measure current lower than could normally be read directly on the scale, there are two turns through the transformer. The ammeter then indicates double the current in the line. This method can be carried further by increasing the number of turns through the transformer, and obtaining the actual current by dividing the reading by the number of turns.

Harry P. Readmon, 53, purchasing agent of the Chicago Pneumatic Tool Company, New York, for the past 12 years, died February 26.

The Department of Commerce has been advised that in order to prevent overproduction in certain lines of manufactures, the Brazilian government has prohibited for three years the importation of industrial machinery except under special license. Orders placed before March 7 will not be affected.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, OF THE MINING CONGRESS JOURNAL, published monthly at Washington, D. C., for April 1, 1931.

City of Washington,
District of Columbia, as:

Before me, a notary public in and for the state and county aforesaid, personally appeared Walter Lukei, who, having been duly sworn according to law, deposes and says that he is the news editor of THE MINING CONGRESS JOURNAL, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 411, Postal Laws and Regulations, printed on the reverse side of this form, to wit:

1. That the names and addresses of the publisher, editor, and business managers are:

Name of publisher, The American Mining Congress, Washington, D. C.
Editor, E. R. Coombes, Washington, D. C.
Business manager, J. M. Hadley, Washington, D. C.

2. That the owners are: The American Mining Congress—a corporation, not for profit. No stockholders. President, R. Livingston Mather, Cleveland, Ohio. Secretary, J. F. Callbreath, Washington, D. C.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None.

WALTER LUKEI,
News Editor.

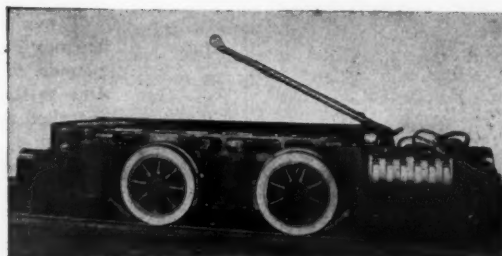
Sworn to and subscribed before me this 31st day of March, 1931.

[SEAL] JAMES C. MARRIOTT,
Notary Public.
(My commission expires October 10, 1934.)



Above—Side view of controller and contactor compartment for explosion tested locomotive.

Right—Explosion tested locomotive.



If you had planned this year's program

If you had planned this year's program for the coal convention of The American Mining Congress we doubt if you could have made it of any more vital interest to you. Eighty-three men from all the coal fields of the country have cooperated earnestly to make the program unusually important. General subjects covered include modern management; safe operating practice; mining systems; mechanical mining; anthracite problems; recent developments in mining practice and in coal cleaning; the new and economically important subject of fuel utilization will be treated at one session.



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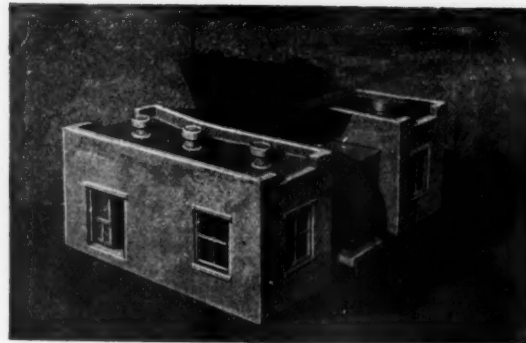


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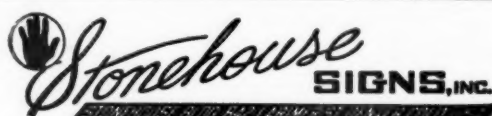
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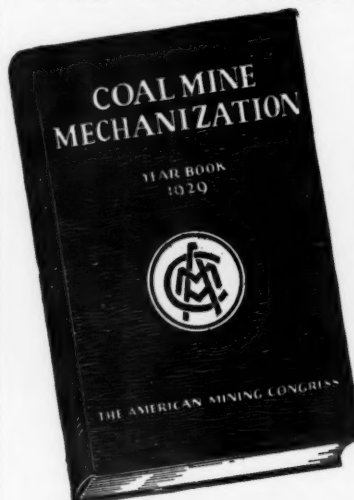
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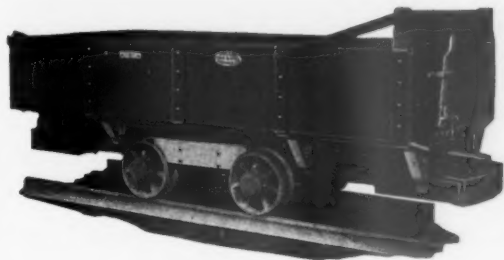
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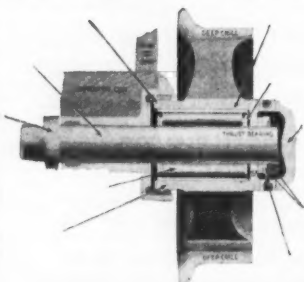
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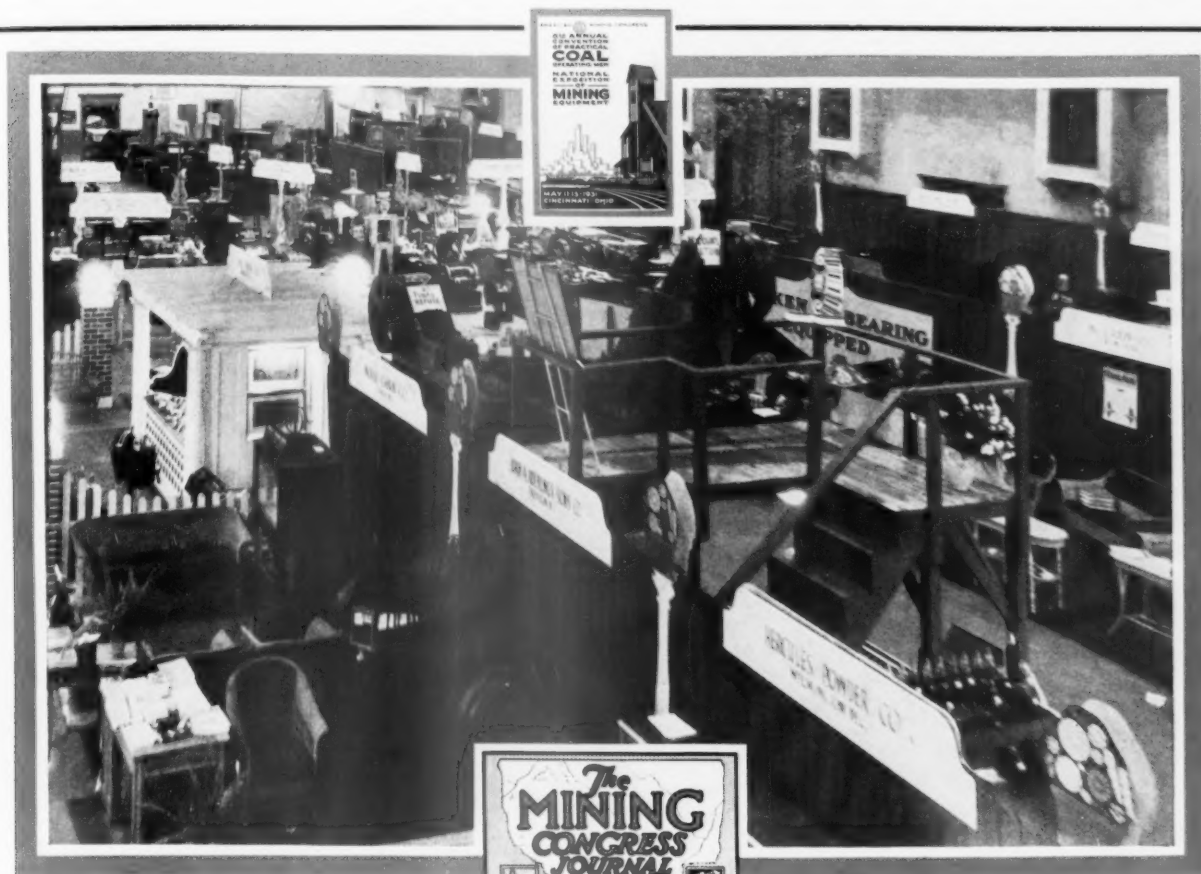
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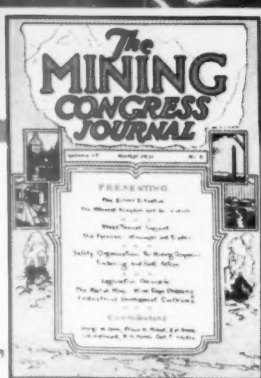
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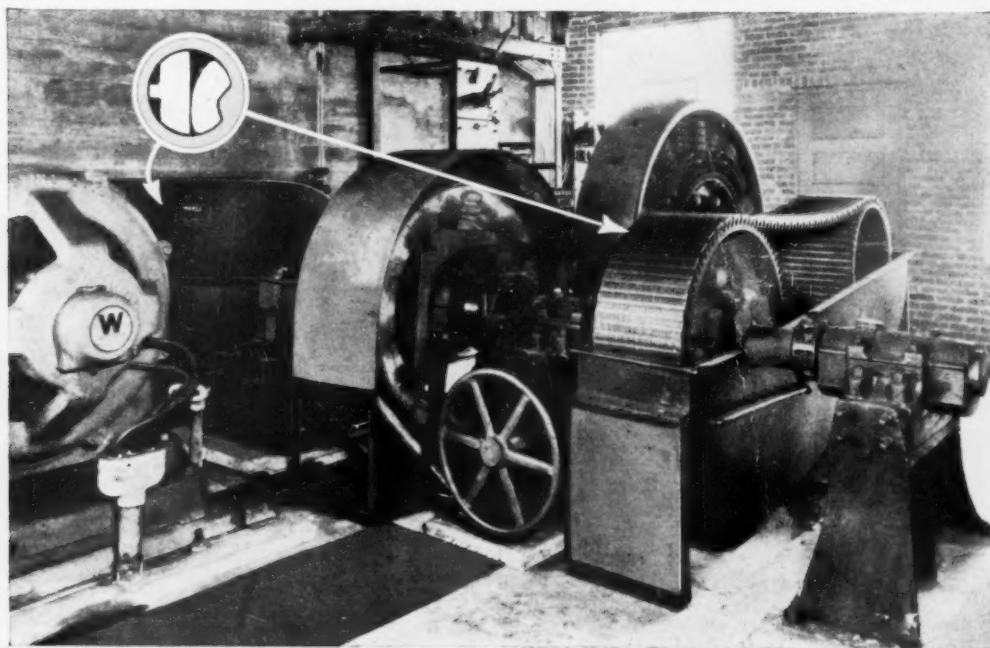
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